Dublin Array
Generation for generations

EIAR Volume 5: Onshore Infrastructure Assessment Chapters
Chapter 5: Noise and Vibration

Kish Offshore Wind Ltd

RWE SLR GoBe APEM Group

www.dublinarray-marineplanning.ie

Dublin Array Offshore Wind Farm

Environmental Impact Assessment Report

Volume 5, Chapter 5: Noise and Vibration

Contents

Figures

Annex Figures

Tables

Glossary

Term	Definition
An Bord Pleanála (ABP)	Competent authority as defined by the Planning Acts to determine the application for development consent for Dublin Array and carry out the EIA and AA of the proposed development.
Applicant	Kish Offshore Wind Limited. Kish Offshore Wind Limited is making the application on behalf of and/or with the consent of the joint holders of the MACs for the maritime area to which the proposed development relates: Kish Offshore Wind Limited, Bray Offshore Wind Limited and DLRCC.
Application for development consent	The planning application to An Bord Pleanála for the construction, operation and decommissioning of Dublin Array under Section 291 of the Planning Act.
British Standard (BS)	A set of standards produced by the British Standards Institution (BSI) to ensure quality and safety in various fields.
Cadna/A	Noise prediction software used to model and assess environmental noise.
Cumulative Effects Assessment (CEA)	The assessment of potential cumulative effects that may arise when effects arising from Dublin Array act cumulatively with impacts from other projects considered in the assessment.
Decibels (dB)	A unit of measurement for sound intensity.
Dublin Array	Dublin Array Offshore Wind Farm. Where the context so provides within the EIAR, references to Dublin Array refer to all geographical areas of the proposed development, i.e. both offshore, onshore and including the proposed O&M Base.
Environmental Impact Assessment (EIA)	Assessment of the likely significant effects of a proposed project on the environment. The EIA will be carried out by An Bord Pleanála in this instance.
EIA Report (EIAR)	As defined in the Planning and Development Act 2000, as amended: "environmental impact assessment report" means a report of the effects, if any, which proposed development, if carried out, will have on the environment and shall include the information specified in Annex IV of the Environmental Impact Assessment Directive.
Institute of Acoustics (IoA)	A professional body for those working in acoustics, noise, and vibration.
Kilograms per meter (kg/m)	A unit of measurement used to calculate the mass or weight of an object per unit length.
Kilovolt (kV)	A unit of electrical potential equal to 1,000 volts.
Landfall Site	The location where the Offshore Export Cable Corridor comes ashore adjacent to the Shanganagh Waste Water Treatment Plant (WWTP).
mm/s	Standards for the assessment of building damage due to vibration, are usually given in terms of peak velocity (usually referred to as Peak Particle Velocity, or PPV) in mm/s.

Term	Definition
Noise sensitive receptor (NSR)	Locations where noise can have a significant impact, such as residential areas, schools, and hospitals.
$L_{Aeq,T}$	The A-weighted equivalent continuous noise level, over the measurement time (T);
$L_{A90,T}$	The A-weighted noise level exceeded for 90% of the measurement time. This parameter is often used to describe background noise;
$L_{A10,T}$	The A-weighted noise level exceeded for 10% of the measurement time. This parameter is often used to describe road traffic noise; and
$L_{Amax,F}$	The maximum A-weighted noise level during the measurement period, with the fast (F) time-weighting.
Offshore infrastructure	Wind turbine generators, offshore substation platform, inter array cables, and offshore export cables.
Onshore Electrical System (OES)	Collective term for all onshore infrastructure from the landfall/TJB to the grid connection point which is likely to be necessary to connect the project to the national grid.
Onshore infrastructure	The Onshore Electrical System and the O&M Base.
Onshore substation	Part of the OES, the substation is required to facilitate the connection to the existing national electricity transmission system.
Operations & Maintenance Base	Part of the onshore infrastructure, located within the administrative boundary of Dún Laoghaire-Rathdown County Council, which will be used to support the management of the construction of the offshore wind farm.
Planning Acts	Planning and Development Act 2000, as amended, and where the context so admits, including also the Planning Regulations.
Receiving environment	The baseline environment.
Transition Joint Bay (TJB)	The proposed infrastructure at the Landfall location where the offshore and onshore cables connect.
Vibration sensitive receptor (VSR)	Locations where vibration can have a significant impact, such as residential areas and sensitive industrial facilities.

Acronyms

Term	Definition
BS	British Standard
CEMP	Construction Environmental Management Plan
DCC	Dublin City Council
DCCAE	Department of Communications, Climate Action and Environment (now DECC)
DECC	Department of the Environment, Climate and Communications (previously DCCAE)
DHPLG	Department of Housing, Planning and Local Government
Dublin Array	Dublin Array Offshore Wind Farm
DL	Dún Laoghaire
DLR	Dún Laoghaire-Rathdown
DLRCC	Dún Laoghaire-Rathdown County Council
DLRCDP	The Dún Laoghaire-Rathdown County Development Plan
DPM	Direct Pipe Method
DPSIR	Driver, Pressure, State, Impact and Response
ECR	Export cable route
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EPA	Environment Protection Agency
EU	European Union
GCP	Grid connection point
HDD	Horizontal Directional Drilling
HGV	Heavy Goods Vehicle
HWM	High Water Mark (tidal)
IEMA	Institute of Environmental Management and Assessment
IoA	Institute of Acoustics
LGV	Light Goods Vehicle
NPF	National Planning Framework
NPO	National policy objective
NSR	Noise sensitive receptor
O&M	Operations and Maintenance
OES	Onshore Electrical System

Term	Definition
OSS	Onshore Substation
PPV	Peak particle velocity
SH	Shanganagh
SPL	Sound power level
TJB	Transition Joint Bay
TCC	Temporary Construction Compound
VSR	Vibration sensitive receptor
WEI	Wind Energy Ireland (formerly known as Irish Wind Energy Association
WEDG	Wind Energy Development Guidelines
WWTP	Waste Water Treatment Plant

Units

Term	Definition
dB	Decibels
kg/m	Kilograms per meter is a unit of measurement used to calculate the mass or weight of an object per unit length.
kV	Kilovolt
$L_{Aeq,T}$	The A-weighted equivalent continuous noise level, over the measurement time (T);
$L_{A90,T}$	The A-weighted noise level exceeded for 90% of the measurement time. This parameter is often used to describe background noise;
$L_{A10,T}$	The A-weighted noise level exceeded for 10% of the measurement time. This parameter is often used to describe road traffic noise; and
$L_{Amax,F}$	The maximum A-weighted noise level during the measurement period, with the fast (F) time-weighting.
m/s	Meters per second (Wind Speed)
mm/s	Standards for the assessment of building damage due to vibration, are usually given in terms of peak velocity (usually referred to as Peak Particle Velocity, or (PPV) in mm/s.

5 Noise and Vibration

5.1 Introduction

5.1.1 This chapter presents the results of the Environmental Impact Assessment (EIA) for the potential impacts of the construction, operation and maintenance and decommissioning phases associated with the onshore infrastructure of the proposed Dublin Array Offshore Wind Farm (Dublin Array) on the noise and vibration environment at nearby noise sensitive receptors (NSRs) and vibration sensitive receptors (VSRs).

5.1.2 Onshore infrastructure collectively refers to the Onshore Electrical System (OES) and the Operations and Maintenance (O&M) Base, which are described in full in Volume 2, Chapter 6: Project Description (hereafter referred to as the Project Description Chapter). The proposed onshore electrical system (OES) comprises all of the onshore electrical transmission infrastructure above the High Water Mark (HWM) associated with Dublin Array. This includes the Transition Joint Bays (TJBs) at Shanganagh Cliffs, a new onshore substation (OSS) and the onshore Export Cable Route (ECR) connecting the TJB and OSS to the national transmission network.

5.1.3 The chapter describes the scope, relevant legislation, assessment methodology and the baseline conditions existing at the site and its surroundings. It considers any potential significant environmental effects the proposed onshore infrastructure will have on this baseline environment; the mitigation measures required to prevent, reduce or offset any significant adverse effects; and the likely residual effects after these measures have been employed. Cumulative noise and/or vibration effects with other proposed developments that may also have an impact on the sensitive receptors close to the proposed onshore infrastructure of Dublin Array are also considered.

5.1.4 Volume 3, Chapter 16: Noise and Vibration (Terrestrial Receptors) (hereafter referred to as the Offshore Airborne Noise chapter) assesses the airborne noise and vibration effects arising from the construction and operation of the offshore infrastructure.

5.1.5 This Environmental Impact Assessment Report (EIAR) chapter is supported by the following technical annexes:

- Annex A Regulatory background ;
- Annex B Construction plant sound levels; and
- Annex C Noise model plots.

5.1.6 This EIAR chapter should also be read in conjunction with the following documents included within the EIAR, due to interactions between the technical aspects:

- Volume 2, Chapter 5: Consideration of Alternatives;
- Volume 2, Chapter 6: Project Description;
- Volume 3, Chapter 16: Offshore Airborne Noise;

- Volume 5, Chapter 6: Onshore Traffic and Transport (hereafter referred to as the Onshore Traffic and Transport Chapter); and

- Volume 6, Technical Appendix 6.5.5-1 Noise and Vibration Technical Baseline Report (hereafter referred to as the Noise and Vibration Technical Baseline Report).

5.2 Regulatory background

5.2.1 In addition to legislation, policy and guidance relevant to offshore renewables captured in Volume 2, Chapter 2: Consents, Legislation, Policy and Guidance (hereafter referred to as the Consents, Legislation, Policy and Guidance Chapter), this section outlines legislation, guidance and policy specific to noise and vibration, including best practice guidelines.

5.2.2 The assessment of potential impacts upon NSRs has been made with specific reference to the relevant guidelines and guidance detailed below. All relevant legislation and policy and how these have been addressed within this assessment are presented in Annex A of this chapter and summarised in Table 1.

Table 1 Legislation, policy, and guidance context

Policy/legislation/publisher	Key provisions	What is covered/section where provision is addressed
Statutory		
Legislation		
European Communities (Environmental Noise) Regulations, 2018 (S.I. No. 549 of 2018) and European Communities (Environmental Noise) (Amendment) Regulations, 2021 (S.I. No. 663 of 2021)	Transposes the amendments to EU Environmental Noise Directive 2002/49/EC into Irish law. The EU Directive aims to provide a common framework to avoid, prevent or reduce, on a prioritised basis, the harmful effects of exposure to environmental noise. For the purposes of these Regulations, environmental noise means unwanted or harmful outdoor sound created by human activities, specifically noise emitted by means of **transport** (road, rail, and air traffic), and from sites of **industrial** activity including those defined in Annex I to Council Directive 96/61/EC6 concerning integrated pollution prevention and control areas. Additionally, the regulations apply only to persistent **long-term** noise exposure, rather than temporary or short-term activities (i.e. construction).	The overarching principles of this legislation have been followed, but these only apply to long-term industrial noise sources, which would occur during the operational phase. However, no specific provisions have been applied, as the regulations primarily require strategic noise mapping and the development of action plans at a national or regional level rather than site-specific assessments. The assessment has considered the impact of operational noise at receptors, as shown in Section 5.11.
Planning policy and development control		
Project Ireland 2040 (Department of Housing, Local Government and Heritage, 2019) National Planning Framework, (NPF) 2023 National Policy Objective 65	Promote the pro-active management of noise where it is likely to have significant adverse impacts on health and quality of life and support the aims of the Environmental Noise Regulations through national planning guidance and Noise Action Plans.	The assessment has considered the impact of construction and operational noise at receptors, as shown in Section 5.11. The assessment has considered the cumulative noise impact of other proposed developments in the area, as shown in Section 5.14.

Policy/legislation/publisher	Key provisions	What is covered/section where provision is addressed
Dún Laoghaire-Rathdown County Development Plan 2022 - 2028	Sets out the policies and objectives for the development of the DLRCC County Development Plan for 2022-2028. Policy EI15 addresses noise and air pollution in relation to new development which makes reference to the Dublin Agglomeration Environmental Noise Action Plan.	The assessment has considered the impact of noise at receptors presented in Section 5.11 to 5.14.
Dublin Agglomoration Environmental Noise Action Plan, 2018 - 2023	The Noise Action Plan aims to avoid, prevent and reduce, where necessary the harmful effects, including annoyance, due to long-term exposure to environmental noise from transportation sources. No specific advice is provided in regard to the assessment of noise from the development.	The assessment has considered the impact of noise at receptors as shown in Section 5.11 to Section 5.14.
Guideline and technical standards		
Environment Protection Agency, 2022	Guidelines on the Information to be Contained in Environmental Impact Assessment Reports	These Guidelines apply to the preparation of all Environmental Impact Assessment Reports undertaken in the State (Ireland). This guidance has been used in the structure and content of the EIAR including this chapter.
Best Practice Guidelines for the Irish Wind Energy Industry (WEI, 2012)	Sets various guidelines for the industry to encourage responsible and sensitive wind farm development, including the subject of noise.	The assessment has considered the impact of noise at receptors as shown in Section 5.11 to Section 5.14.
Wind Energy Development Guidelines (DHPLG, 2006)	These Guidelines offer advice to planning authorities in determining applications for planning permission and are of assistance to developers and the wider public in considering wind energy development. The guidelines are also intended to ensure a consistency of approach throughout the country in the	This guidance is considered within the construction noise and vibration impact assessments throughout this chapter. The draft revised Guidelines, 2019 are also noted for information.

Policy/legislation/publisher	Key provisions	What is covered/section where provision is addressed
	identification of suitable locations for wind energy development and the treatment of planning applications for wind energy developments.	
Draft Revised Wind Energy Development Guidelines (DHPLG, 2019)	The 2019 Draft Revised Wind Energy Development Guidelines (WEDG) ensure wind energy projects in Ireland follow best practices and actively engage communities. These principles guide the assessment of construction noise and vibration impacts, ensuring transparent communication with affected communities and stakeholders. These Guidelines have not been formally adopted and remain in draft form.	Recognising that these Guidelines remain in draft form, they have been considered in seeking to ensure the project adheres to the highest standards of best practice. This guidance is therefore considered within the construction noise and vibration impact assessments where relevant, noting that concentrated communication with all relevant stakeholders should take place to confirm any aspects of the project which have evolved and any potential impacts resulting to the community because of construction operations. This guidance is considered within the construction noise and vibration impact assessments, and notes that concentrated communication with all relevant stakeholders should take place to confirm any aspects of the project which have evolved and any potential impacts resulting to the community because of construction operations.
BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise (BS 5228-1) and Part 2: Vibration (BS5228-2);	BS 5228 is referenced in the Best Practice Guidelines for the Irish Wind Energy Industry for the assessment of construction noise and vibration impacts.	Construction threshold criteria and noise source sound power level information has been extracted from this document, see Table 5.

Policy/legislation/publisher	Key provisions	What is covered/section where provision is addressed
BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound (BS 4142)	BS 4142 is used for the evaluation of operational noise effects.	Assessment methodology of industrial sound at residential receptors has been extracted from this document, see Section 5.8.
Guidance on EIS and NIS Preparation for Offshore Renewable Energy Projects' (DECC 2017)	The purpose of this non-statutory guidance is twofold: ▪ To assist developers in preparing Environmental Impact Statements (EIS) and Natura Impact Statements (NIS) that may be required for development projects; and ▪ To provide competent authorities, consultation bodies and the public with a basis for determining the adequacy of these statements.	This guidance has been used in the structure and content of the EIAR, including this chapter.

5.3 Consultation

5.3.1 In preparation of the EIAR for Dublin Array, consultation has been undertaken with various statutory authorities. The Dublin Array EIA Scoping Report was issued to statutory consultees and made publicly available on 9th October 2020.

5.3.2 To date, consultation with regards to the scope of the EIAR has taken place via the Scoping Report. In addition, the Dublin Array project website has been created to inform the public about all aspects of the proposed development, with public consultations conducted in January to March 2023.

5.3.3 Two public consultations were undertaken in relation to the Dublin Array project, with the first phase being undertaken in Autumn 2020. The virtual public consultation included public exhibition boards, FAQs, and a copy of the EIA Scoping report. A second public consultation was undertaken Spring 2023, where the project information was displayed at 8 in-person events, and a virtual public consultation.

5.3.4 The website is used to notify members of the public of project updates, project timelines, upcoming public consultation and any changes in the design and layout as a consequence of consultations, environmental assessment, and engineering. It also provides an avenue for the public to contact Dublin Array directly

5.3.5 These statutory and public consultations provided opportunities for stakeholders to learn about the project, ask questions, provide feedback, and help to inform them about the development process.

5.3.6 The Health and Safety Authority (HSA) responded to the Scoping Report in a letter dated 17th November 2020, however no comments relating to noise and vibration were provided.

Table 2 Summary of consultation relating to Noise and Vibration

Date	Consultation type	Consultation and key issues raised	Section where provision is addressed
2019-2024	General engagement – DLRCC	DLRCC are the majority landowner and roads authority for the OES & O&M Base. General engagement with DLRCC has been maintained through 2020-2024, with a particular focus between 2022-present, with specific reference to the OSS, the final onshore ECR, Landfall Site and O&M Base.	Project Design Features and Other Avoidance and Preventative Measures Section 5.10.
Oct 2020	EIA Scoping – Health & Safety Authority	No comments made on proposed methodology	n/a

5.4 Methodology

Study area

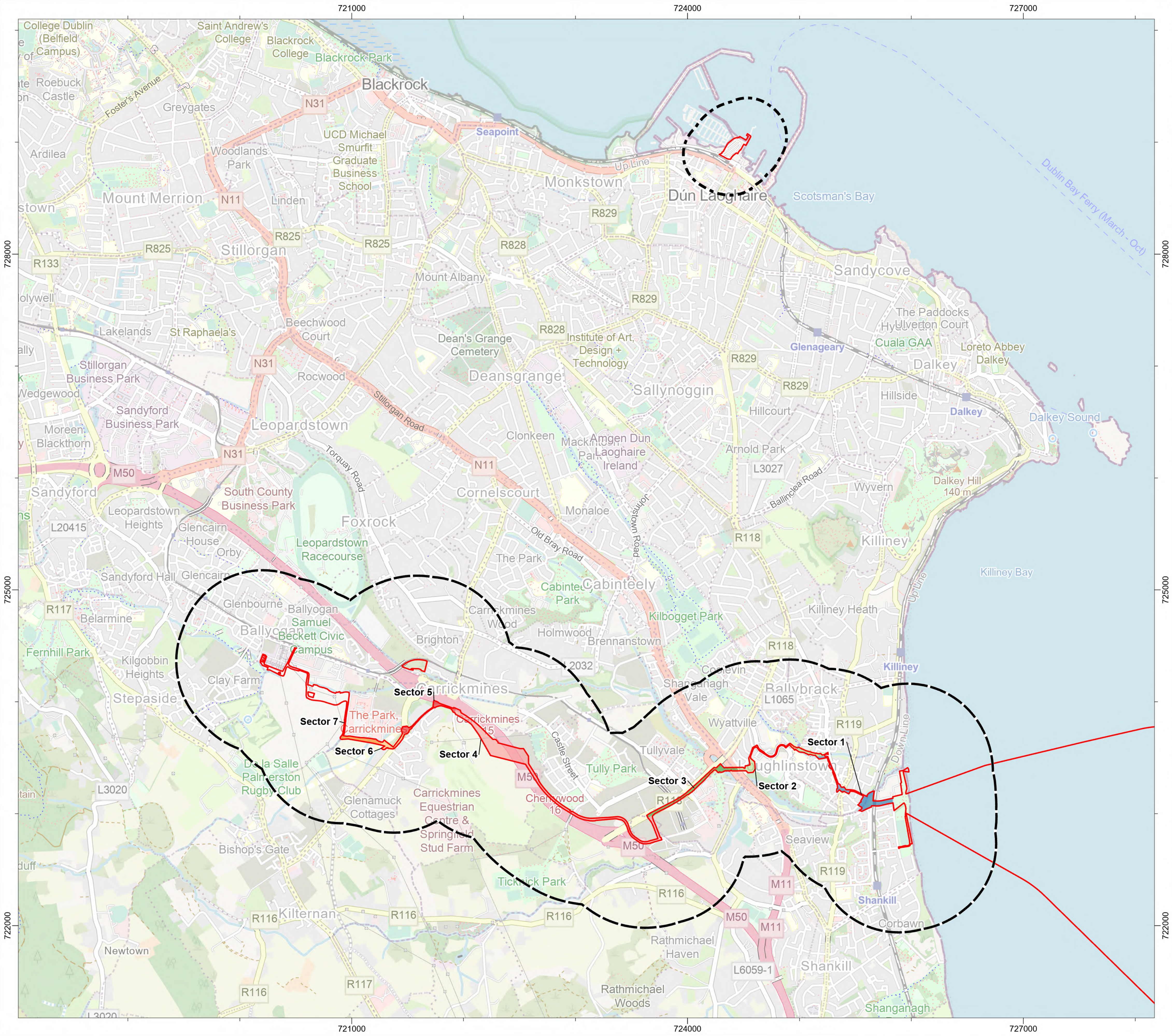
5.4.1 The methodology for this chapter has included monitoring to establish the baseline information available on the noise environment within a defined study area for the OES and O&M Base. There is no requirement for baseline vibration monitoring, therefore this has not been undertaken.

5.4.2 The location of the OES study area is shown in Figure 1 and comprises:

- Landfall Site;
- Onshore ECR; and
- OSS.

5.4.3 The OES study area comprises the onshore transmission infrastructure located between the proposed Landfall Site at Shanganagh Cliffs, to the OSS at Jamestown. It also includes the onshore grid connection, which runs from the OSS to the existing national electricity transmission substation at Carrickmines; and the Carrickmines grid connection point (GCP).

5.4.4 The location of the O&M Base is also shown on Figure 1 and is located within Dún Laoghaire Harbour.



Application Site Boundary
Onshore Electrical System (OES) 750 m Buffer
Operations and Maintenace Base (O&M Base) 320 m Buffer

Export Cable Route (ECR) Sector

- Sector 1
- Sector 2
- Sector 3
- Sector 4
- Sector 5
- Sector 6
- Sector 7

DRAWING STATUS

PUBLIC

DISCLAIMER

MAP NOTES / DATA SOURCES:

Esri UK, Esri, TomTom, Garmin, Foursquare, FAO, METI/NASA, USGS, Map data © OpenStreetMap contributors, Microsoft, Facebook, Inc. and its affiliates, Esri Community Maps contributors, Map layer by Esri ©Ordnance Survey Ireland 2023 © Tailte Éireann. (CYSL50270365) Not to be used for Navigation.

PROJECT TITLE

Dublin Array

DRAWING TITLE

Noise and Vibration: Study Area

DRAWING NUMBER: **Figure: 1**

PAGE NUMBER: **1 of 1**

VER	DATE	REMARKS	DRAW	CHEK	APRD
01	2025-02-12	DRAFT	JK	SW	AE
02	2025-01-31	Public	JK	AM	AM

0 0.3 0.5 0.8 1 Kilometers
0 0.1 0.3 0.4 0.5 Miles

SCALE 1:35,000 | PLOT SIZE A3
DATUM IRENET95 | VERTICAL REF ODN/LAT/MLLW
PRJ IRENET95 Irish Transverse Mercator

SLR

Dublin Array — Generation for generations
Kish Offshore Wind Limited - Bray Offshore Wind Limited

Onshore Electrical System (OES)

5.4.5 The OES comprises all of the onshore electrical transmission infrastructure above the HWM associated with the Dublin Array project. This includes the TJBs at the Landfall Site, the new OSS, and the onshore ECR connecting the TJB and OSS to the national transmission network. An onshore grid connection will connect the OSS to the Carrickmines CGP.

Landfall Site

5.4.6 The two offshore export cables will come ashore at the Landfall Site, located at Shanganagh Cliffs to the south of the Uisce Éireann Shanganagh Wastewater Treatment Plant (WWTP), where they will connect to the Onshore ECR in two underground TJBs. The TJBs will be located on the land above and set back from the cliff edge by approximately 90 m.

5.4.7 The Landfall Site is bounded to the west by Shanganagh Cliffs road, with residential dwellings beyond. The WWTP is located to the north, with a coastal path and the cliffs to the east. To the south, the area is bounded by open amenity land and sports pitches, with residential dwellings located on Seafield road.

5.4.8 A temporary construction compound (TCC) will be established at the Landfall Site for the TJB installation and associated with trenchless installation techniques for the onshore and offshore export cables.

Onshore ECR

5.4.9 The onshore ECR is sub-divided into seven areas referred to as 'Sectors' for reference purposes, along the 7.4 km route. Sector 1 is located west of the Landfall Site at Shanganagh Cliffs, with Sector 7 leading to the OSS at Jamestown. A full description of the Onshore ECR including the sectors is set out in the Project Description Chapter.

5.4.10 The onshore ECR length will be up to 8 km and is predominantly proposed within public roads or public land, with some short sections being located in private land.

5.4.11 The noise and vibration study area for the onshore ECR, extends from Shanganagh Cliffs to the OSS, and includes the nearest NSRs either side of the onshore ECR. At its closest extents, these are located 5 to 10 m from the onshore ECR.

5.4.12 TCCs will be established at Clifton Park (Sector 1) and Leopardstown (north of Junction 15 of the M50), to support the construction phase of the onshore ECR. The Leopardstown TCC will be located to the southern approach to Leopardstown Racecourse. They will be used for the provision of storage and welfare facilities, which comprises of parking and site office cabins. It will also include construction equipment and material laydown and storage, for the duration of the construction phase. A detailed description of all TCCs is set out in the Project Description Chapter.

5.4.13 At eight locations along the Onshore ECR, trenchless drilling techniques will be deployed in order to cross linear constraints.

5.4.14 Horizontal Directional Drilling (HDD) or similar techniques will be utilised as an alternative methodology to open-cut trenching to cross significant environmental and physical features such as watercourses, utilities, and roads. The trenchless crossing locations are set out in Table 3.

Table 3 Trenchless crossing locations along the onshore ECR

Trenchless Crossing Reference No.	Obstacle	Location	Sector No.
TX-01*	DART/Railway line	Shanganagh Cliffs – Clifton Park	1
TX-02	Shanganagh River	Clifton Park – Bayview Crescent	1
TX-03	Shanganagh Road – Killiney Hill Road Roundabout (R119)	Bayview Glade - Shanganagh Road	1
TX-04	Kill O' the Grange Stream	Achill Road - Loughlinstown Linear Park	1, 2
TX-05	Kill O' the Grange Stream	Loughlinstown Linear Park	2
TX-06*	N11, Loughlinstown River	European– Cherrywood Park	2, 3
TX-07*	M50	Carrickmines Great	4
TX-08	Glenamuck District Distributor Road, Golf Stream	Carrickmines Great	6, 7
* Operations during the daytime, evening, and nighttime periods (as set out Table 5), have been considered at these locations i.e. 24hr drilling activities.			

5.4.15 The Clifton Park TCC will be the location for the launch pit for two trenchless crossings along the onshore ECR; one under the DART railway line and Shanganagh Community Gardens (TX-01), and another under Shanganagh River (TX-02) into Bayview Crescent.

5.4.16 The Project Description Chapter provides a full description of Onshore ECR cable route and sector breakdown.

OSS and grid connection

5.4.17 An OSS and grid connection will be required to collect and connect the power to the Carrickmines GCP. The proposed location for the OSS is in close proximity of the Carrickmines GCP and comprises open land at the Ballyogan Landfill Facility and Recycling Park (under active Waste Licence W0015-01). The landfilling services have ceased and the former landfill has been capped. The Ballyogan Recycling Centre is operational along with the DLR Operations Centre and DLR Maintenance Depot.

5.4.18 To the north, the site is bordered by open land and industrial/commercial uses, with residential dwellings beyond. To the east, the site is bordered by the Carrickmines Retail Park shopping centre, with commercial and office uses beyond. To the south and west, the site is bordered by open grass land (also part of the former Ballyogan Landfill Facility and Stepaside Golf Course, with residential areas beyond.

5.4.19 Located approximately 80 m to the north of the proposed site, is the Ballyogan Regional Temporary Rest Centre—a 24-hour facility providing short-term shelter for refugees requiring housing support. Designed for short term transient shelter, rather than long-term residency, it is considered that the centre is not subject to the same noise sensitivity considerations as conventional residential dwellings. In any case, the rest centre is situated at a similar distance from the proposed OSS, as the DLR Operations Centre; consequently, any future impacts from the proposed OSS are expected to be comparable at the rest centre.

5.4.20 The study area extends to the nearest residential receptors to the north, south, east and west of the proposed OSS; at their furthest extents, these are located approximately 780 m from the proposed site.

5.4.21 A grid connection measuring 750 m in length will connect the OSS to the Carrickmines GCP. The route will largely be located within the extent of the existing access roads in the Ballyogan Landfill and Recycling Park.

O&M Base

5.4.22 In order to service and maintain the offshore infrastructure, a storage and coordination facility is required (referred to as the Operations and Maintenance Base). The Operations and Maintenance (O&M) Base will act as a storage and loading area for small and medium spare parts for the wind turbines generators and small ancillary equipment such as tools and consumables.

5.4.23 The proposed development will provide offices and warehouse space together with berthing facilities for maintenance vessels (referred to as CTVs) associated with operation and maintenance of Dublin Array.

5.4.24 The proposed development will be located on, and directly adjacent to St. Michaels Pier, within Dún Laoghaire Harbour, Co. Dublin.

5.4.25 The study area has a radius of 320 m from the O&M Base, as shown in Figure 1. Dún Laoghaire Harbour is located within a mixed-use urban area and includes the former ferry terminal at St Michael's Pier. The Dún Laoghaire East Pier is located to the east, and Dún Laoghaire Marina and West Pier to the west, with a mixture of commercial harbour uses within these areas, including several yacht clubs.

5.4.26 Harbour Road, Crofton Road and Queens Road, are located to the south, along with Dún Laoghaire train station and the railway line. Beyond the roads, there are a mixture of buildings used for public, leisure, and commercial uses, along with residential apartments.

5.4.27 The study area extends to the nearest residential receptors to the southeast and southwest of the O&M Base; at their furthest extents, these are located approximately 300 m from the site of the proposed O&M Base.

Baseline data

Landfall Site

5.4.28 To inform the assessment, daytime and nighttime noise surveys were undertaken at the Landfall Site. Noise monitoring locations were selected to be representative of NSRs with the greatest potential to be affected by noise from the construction phase.

5.4.29 The NSRs and monitoring locations were identified using local information derived from site inspections, aerial imagery, and mapping. The results of the baseline noise surveys are detailed in full within the Noise and Vibration Technical Baseline Report.

Onshore ECR

5.4.30 To inform the assessment, daytime and nighttime noise surveys have been undertaken at three locations on the Onshore ECR where trenchless crossings will be required; in Sector 1 (TX-01), Sector 2 (TX-06), and Sector 4 (TX-07). Please refer to Table 3 for a reference list of the trenchless crossings.

5.4.31 The NSRs and monitoring locations were identified using local information derived from site inspections, aerial imagery, and mapping. The results of the baseline noise surveys are detailed in full within the Noise and Vibration Technical Baseline Report.

OSS

5.4.32 To inform the assessment, daytime and nighttime noise surveys were undertaken at the proposed OSS location at Ballyogan. Noise monitoring locations were selected to be representative of NSRs with the greatest potential to be affected by noise from the construction and operational phases.

5.4.33 The NSRs and monitoring locations were identified using local information derived from site inspections, aerial imagery, and mapping. The results of the baseline noise surveys are detailed in full within the Noise and Vibration Technical Baseline Report.

O&M Base

5.4.34 To inform the assessment, daytime and nighttime noise surveys were undertaken close to the proposed O&M Base at Dún Laoghaire Harbour. Noise monitoring locations were selected to be representative of NSRs with the greatest potential to be affected by noise from the construction and operational phases.

5.4.35 The NSRs and monitoring locations were identified using local information derived from site inspections, aerial imagery, and mapping. The results of the baseline noise surveys are detailed in full within the Noise and Vibration Technical Baseline Report.

Assessment methodology

5.4.36 This methodology adopted for the noise and vibration assessment is outlined below and has developed in line with the principles set out in the EPA 2022 Guidelines on the Information to be Contained in Environmental Impact Assessment Reports. While these guidelines provide a framework for assessing environmental effects, this section specifically focuses on the approach used to evaluate the noise and vibration impacts.

5.4.37 The assessment of potential impacts on receptors has been carried out with reference to the specific methodologies detailed below. All relevant standards and guidance, along with their application within this assessment, are comprehensively addressed in Annex A of this chapter.

Construction phase

5.4.38 The constriction phase assessment has been undertaken in conjunction with BS5228:2009+A1:2014, 'Code of Practice for Noise and Vibration Control on Construction and Open Sites Part 1 Noise, and Part 2 Vibration'.

5.4.39 Construction noise limits have been set at the identified NSRs in conjunction with the measured baseline levels and the ABC Method contained in BS5228:2009+A1:2014-1. Construction noise levels have been predicted at the identified NSRs using the Cadna/A noise modelling software and the calculation algorithms contained in BS5228:2009+A1:2014-1.

5.4.40 Where adverse impacts have been identified, specific mitigation measures, a suite of measures, or further design refinement have been proposed to mitigate these adverse impacts.

Operational phase

5.4.41 The assessment of operational noise at residential receptors has been undertaken in conjunction with BS 4142:2014+A1:2019 'Methods for Rating and Assessing Industrial and Commercial Sound'.

5.4.42 Operational sound levels have been predicted at the NSRs using the Cadna/A noise modelling software, and a subjective opinion of the potential acoustic features has been included, which considers corrections for tonal, impulsive and/or intermittent characteristics.

5.4.43 The results of the assessment have been used to determine whether operational noise generated by the development would lead to adverse impacts at the nearest NSRs.

5.4.44 At any identified commercial receptors, specifically those located close to the OSS, any change in noise has been assessed in accordance with the Institute of Environmental Management and Assessment (IEMA) 'Guidelines for Environmental Noise Impact Assessment'.

5.4.45 The significance of an effect is measured based on EPA 2022 and professional judgment. As with construction noise, where adverse impacts have been identified, specific mitigation measures are detailed where they are required to reduce any identified impacts. It is expected that design refinement and/or mitigation options can be applied to the design presented within the EIAR to reduce the impact to a level that is not significant.

Decommissioning

5.4.46 The decommissioning process for the onshore infrastructure is expected to follow a reverse sequence of the construction phase. The specific approach will be determined closer to the time, decommissioning activities will need to comply with all relevant conditions of the Development Consent, incorporate best available techniques, and adhere to legislative and environmental obligations in place at that stage.

5.4.47 Given the evolving nature of policy and technology, the exact decommissioning methodology cannot be defined at this stage. However, it is anticipated that environmental impacts will be comparable to or lower than those assessed for the construction phase. Where necessary, updated mitigation measures will be implemented to align with best practice at the time.

Cumulative impact assessment

5.4.48 The impact of the construction and operational activities of all onshore infrastructure are assessed cumulatively with any other planned developments in the vicinity.

5.5 Assessment criteria

5.5.1 The criteria for the construction and operational assessments and resulting noise and vibration effect significance is dependent on two main factors: the sensitivity of the receptor location and the impact magnitude.

Sensitivity of receptor criteria

5.5.2 The sensitivity of the environment has been defined in Table 4. These apply equally to the assessment of construction and operational noise and vibration impacts and have been based on professional judgement and follows the 'Guidelines on the information to be contained in Environmental Impact Assessment Reports' guidelines published by the Environmental Protection Agency in May 2022 (EPA 2022).

Table 4 Sensitivity/importance of environmental receptors

Receptor sensitivity	Definition
High	Noise may be detrimental to vulnerable receptors, such as rooms within hospitals that require high level of focus (e.g. operating theatre) or care for vulnerable groups of people (e.g. high dependency unit).
Medium	Noise may cause disturbance, and a level of protection is required, but a level of tolerance is expected. Example receptors include at all times of the day: dwellings, hospital wards and care homes and daytime only receptors including education facilities.
Low	Leisure and sports facilities including public parks and non-noise-producing employment such as offices. Noise and vibration may be heard or felt but are unlikely to result in any change in behaviour.
Negligible	All other areas including industrial and agricultural. Noise and vibration are unlikely to have any effect.

Magnitude of impact criteria

5.5.3 The magnitude of impact will vary depending on the nature of the source of noise experienced. Each of the relevant different sources of noise, that will arise from the offshore infrastructure, are discussed below and the magnitude of impact quantified. The values specified for the various magnitudes of impact have been derived from guidance documentation or standards relevant to nature of the source.

Construction noise impact magnitude

5.5.4 The impact of construction noise upon NSRs has been determined with reference to the BS 5228-1. Annex E of BS 5228-1 which provides criteria for the assessment of the potential significance of construction noise effects.

5.5.5 Two example methods are discussed in the BS 5228-1. The first of these categorises the existing noise environment based on measured levels from A, which has the lowest noise, to C; and a second method that considers the increase in noise as a result of the introduction of construction activities, subject to lower cut off values for different periods of the day.

5.5.6 The most stringent threshold values for both methods are the same and have been adopted to represent the threshold at which an observed effect will occur. The threshold values differ for the time of day to reflect the impacts upon typical activities at an NSR during these times.

Table 5 Construction noise threshold values

Period	Definition	Threshold, dB L_{Aeq}
Nighttime	23:00 – 07:00 hours all days of the week.	45
Evenings and weekends	19:00 – 23:00 hours weekdays; 14:00 – 23:00 hours Saturdays; 07:00 – 23:00 hours Sundays.	55
Daytime	07:00 – 19:00 hours Monday to Friday; 07:00 – 13:00 hours Saturdays.	65

5.5.7 BS5228-1 provides advice on the likely impacts of construction noise with regard to the duration of exposure. For areas with a prevailing quiet environment, where the construction noise level outside a dwelling exceeds the trigger levels presented in Table 6 for a period of 10 or more days in any 15 consecutive days, or for a total number of days exceeding 40 in any 6 consecutive months, it is deemed to be significant. In these circumstances, additional measures such as noise insulation or temporary rehousing may be appropriate.

Table 6 Construction noise insulation trigger levels

Period	Relevant time period	Averaging time, T	Noise insulation trigger level, dB $L_{Aeq,\,T}$
Monday to Friday	07:00 – 08:00	1 hour	70
	08:00 – 18:00	10 hours	75
	18:00 – 19:00	1 hour	70
	19:00 – 22:00	3 hours	65
	22:00 – 07:00	1 hour	55
Saturday	07:00 – 08:00	1 hour	70
	08:00 – 13:00	5 hours	75
	13:00 – 14:00	1 hour	70
	14:00 – 22:00	3 hours	65
	22:00 – 07:00	1 hour	55
Sundays and public holidays	07:00 – 21:00	1 hour	65
	21:00 – 07:00	1 hour	55

5.5.8 The impact magnitude for construction noise is set out in Table 7 and the threshold value is as per Table 5 above.

Table 7 Magnitude of construction noise impact

Impact magnitude	Exceedance in the $L_{Aeq,t}$ noise level
High	Threshold value exceeded by more than 5 dB for a period of 10 or more days in any 15 consecutive days, or for a total number of days exceeding 40 in any 6 consecutive months.
Medium	Threshold value exceeded by more than 3 dB and up to 5 dB, for a period of 10 or more days in any 15 consecutive days, or for a total number of days exceeding 40 in any 6 consecutive months.

Impact magnitude	Exceedance in the $L_{Aeq,t}$ noise level
Low	Threshold value exceeded by up to 3 dB, OR threshold value exceeded by more than 3 dB for a period of less than 10 days in any 15 consecutive days, or for a total number of days not exceeding 40 in any 6 consecutive months.
Negligible	Threshold value not exceeded.

Construction vibration impact magnitude

5.5.9 The impact of construction vibration upon existing residential receptors will be determined with reference to BS5228-2:2009+A1:2014. The impact of construction vibration upon residential receptors is as detailed in Table 8.

Table 8 Magnitude of construction vibration impact

Impact Magnitude	Predicted PPV Level
High	10.0 mm/s or more
Medium	Between 1.0 to 9.9 mm/s
Low	Between 0.3 to 0.9 mm/s
Negligible	Between 0.01 and 0.3 mm/s

Operational noise impact magnitude – residential receptors

5.5.10 The impact of operational noise at existing residential receptors has been determined with reference to BS 4142.

5.5.11 Based on the guidance presented in BS 4142, the magnitude of impact of operational noise upon existing residential receptors is detailed in Table 9.

Table 9 Magnitude of operational noise impact – residential receptors

Impact Magnitude	Description
High	Rating level is 10 dB(A) or more above the background sound level.
Medium	Rating level is between 6 and 9 dB(A) above the background sound level.
Low	Rating level is between 1 and 5 dB(A) above the background sound level.
Negligible	Rating level is equal to or below the background sound level.

Operational noise impact magnitude – commercial receptors

5.5.12 The impact of operational noise from the substation upon existing commercial receptors has been determined with reference to the IEMA guidelines.

5.5.13 Based on Table 7-10 within the Guidelines, the magnitude of impact of operational noise upon existing commercial receptors is detailed in Table 10.

Table 10 Magnitude of operational noise impact– commercial receptors

Impact Magnitude	Description
High	Change in ambient sound level ($L_{Aeq,T}$) of 10 dB or more.
Medium	Change in ambient sound level ($L_{Aeq,T}$) between 5.0 and 9.9 dB.
Low	Change in ambient sound level ($L_{Aeq,T}$) between 3 and 4.9 dB.
Negligible	No change in ambient sound level ($L_{Aeq,T}$) of 2.9 dB or less.

Defining the significance of effect

5.5.14 The sensitivity of a receptor and the magnitude of impact have been considered collectively to determine the potential effect and its significance. The collective assessment represents a considered assessment by the assessor, based on the likely sensitivity of the receptor to the change (e.g. is a receptor present which will be affected by the change), and then the magnitude of that change.

5.5.15 Table 11 below is used as a guide to determine the level of effect. 'Major' and 'Moderate' effects are considered to be 'Significant' in terms of the EPA 2022 guidelines.

5.5.16 Impact magnitudes can be adverse, neutral, and positive. In the terms of the noise and vibration assessment, the onshore infrastructure only has the potential to introduce new sources to the existing environment, rather than offering a reduction to existing noise levels.; therefore, positive impacts have not been considered within the table.

Table 11 Significance of potential effects

Description of impact magnitude			Existing Environment - Sensitivity			
			High	**Medium**	**Low**	**Negligible**
	Adverse impact	**High**	Profound or Very Significant (significant)	Significant	Moderate*	Imperceptible
	Adverse impact	**Medium**	Significant	Moderate*	Slight	Imperceptible
	Adverse impact	**Low**	Moderate*	Slight	Slight	Imperceptible
	Neutral impact	**Negligible**	Not significant	Not significant	Not significant	Imperceptible

**Moderate levels of effect have the potential, subject to the assessor's professional judgement, to be significant. Moderate will be considered as significant or not significant in EIA terms, depending on the sensitivity and magnitude of change factors evaluated. These evaluations are explained as part of the assessment where they occur.*

5.5.17 In addition, based on the EPA Guidelines (2022) and professional judgement, it is considered that, for the construction phase, operational phase and decommissioning phase, the following definitions of duration are appropriate for this Chapter:

- **Short-term** is defined as less than one-month;
- **Medium-term** is defined as one month to two years; and
- **Long-term** is defined as greater than three years.

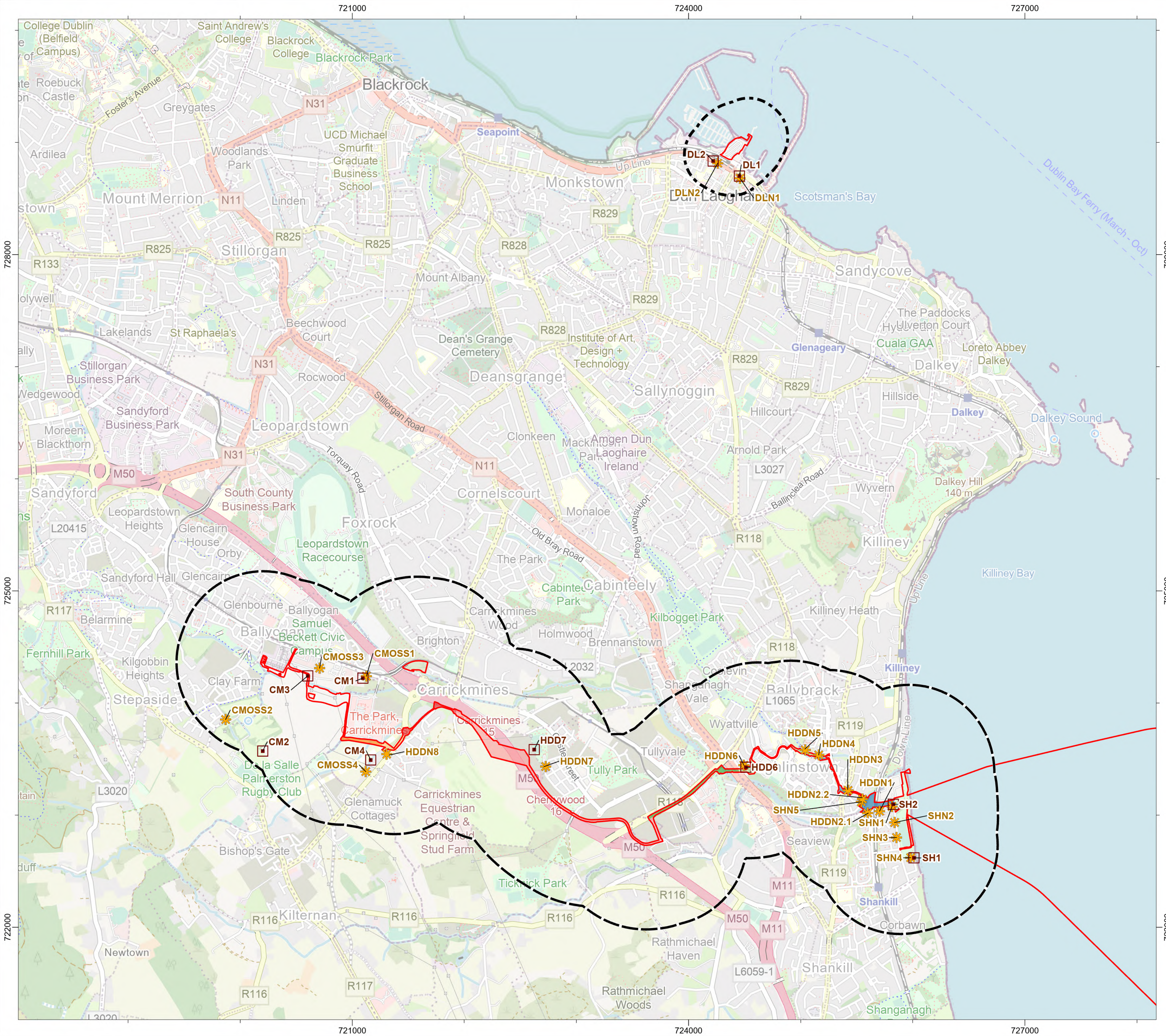
5.5.18 While the EPA Guidelines (2022) provide general definitions for duration, these classifications have been specifically applied within this Chapter to reflect the nature and timescales of the project in relation to the assessment of noise and vibration.

5.6 Receiving environment

5.6.1 The results of the baseline noise surveys are detailed within the Noise and Vibration Technical Baseline Report.

5.6.2 A review of the key findings from that study has been incorporated into the description of the receiving environment. This section is not intended to repeat or to carry out any additional assessment of impacts within the technical report.

5.6.3 Figure 2 below shows all the monitoring locations within the two study areas: The OES and the O&M Base study areas.



- Application Site Boundary
- Onshore Electrical System (OES) 750 m Buffer
- Operations and Maintenace Base (O&M Base) 320 m Buffer

Export Cable Route (ECR) Sector

- Sector 1
- Sector 2
- Sector 3
- Sector 4
- Sector 5
- Sector 6
- Sector 7
- Noise Sensitive Receptor (NSR) Location
- Noise Monitoring Location

DRAWING STATUS

PUBLIC

DISCLAIMER

MAP NOTES / DATA SOURCES:

Esri UK, Esri, TomTom, Garmin, Foursquare, FAO, METI/NASA, USGS, Map data © OpenStreetMap contributors, Microsoft, Facebook, Inc. and its affiliates, Esri Community Maps contributors, Map layer by Esri ©Ordnance Survey Ireland 2023 © Tailte Éireann. (CYSL50270365) Not to be used for Navigation.

PROJECT TITLE

Dublin Array

DRAWING TITLE

Noise and Vibration: Noise Monitoring Locations

DRAWING NUMBER: **Figure: 2**

PAGE NUMBER: **1 of 1**

VER	DATE	REMARKS	DRAW	CHEK	APRD
01	2025-02-12	DRAFT	JK	SW	AE
02	2025-01-31	Public	JK	AM	AM

0 0.3 0.5 0.8 1 Kilometres

0 0.1 0.3 0.4 0.5 Miles

N GRID NORTH

SCALE	1:35,000	PLOT SIZE	A3
DATUM	IRENET95	VERTICAL REF	ODN/LAT/MLLW
PRJ	IRENET95 Irish Transverse Mercator		

SLR

Dublin Array
Generation for generations
Kish Offshore Wind Limited - Bray Offshore Wind Limited

Landfall Site

5.6.4 At the Landfall Site, noise monitoring has been undertaken at two monitoring locations in Shanganagh (SH), which are considered representative of the closest residential receptors.

5.6.5 The monitoring locations are detailed in Table 12, and shown in Figure 3.

Table 12 Landfall Site – monitoring location

Location	Description	Co-ordinates (x, y)
SH1	Located to the south of the Landfall Site, and adjacent to residential dwellings on Seafield Road, Shanganagh.	125711, 379216
SH2	Located adjacent to the western boundary of the Landfall Site, and adjacent to residential dwellings on Shanganagh Cliffs Road, Shanganagh.	125567, 379716

Figure 3 Landfall Site – monitoring location plan

5.6.6 Attended monitoring was undertaken during the daytime, evening, and night-time periods, and the results of the baseline survey are detailed in full within the Noise and Vibration Technical Baseline Report.

Evaluation of measured baseline noise levels

5.6.7 The measured baseline noise levels have been evaluated in conjunction with the ABC Method contained in BS 5228-1 to calculate the daytime, evening, and night-time construction noise threshold limits, which is shown in Table 13.

5.6.8 It should be noted that the measured ambient sound levels have been rounded to the nearest decibel.

Table 13 Evaluation of measured levels and determination of BS5228-1 threshold values, dB

Location	Period	Lowest measured ambient level $L_{Aeq,T}$	Threshold value $L_{Aeq,T}$
SH1	Daytime	48	65
	Evening	47	55
	Night-time	32	45
SH2	Daytime	52	65
	Evening	45	55
	Night-time	43	45

Onshore ECR

5.6.9 Baseline surveys have been undertaken at locations on the Onshore ECR where works will be required outside normal working hours to facilitate the installation of the cable at some of the trenchless crossing locations. At these locations it may be necessary to undertake continuous daytime and night-time operations. These trenchless crossings are summarised in Table 14, together with the monitoring location at each crossing. Additionally, the crossings and monitoring locations are shown in Figure 3 and Figure 4.

Table 14 Landfall site – Baseline monitoring locations at receptors

Monitoring Location	Trenchless crossing Reference No.	Description	Co-ordinates (x, y)
SH2	TX-01 Railway Line crossing, Sector 1 (see Figure 3)	Located adjacent to residential dwellings on Shanganagh Cliffs Road. This location is considered to be representative of residential dwellings close to the Clifton Park TCC, associated with the trenchless crossing.	125567, 379716
HDD6	TX-06 N11 crossing, Sector 2 to 3 (see Figure 4)	Near the gatehouse, at Eurofound, Wyattville Rd, Loughlinstown. This location is considered to be representative of residential dwellings to the north of the trenchless crossing	124283, 380154

Monitoring Location	Trenchless crossing Reference No.	Description	Co-ordinates (x, y)
		compound, associated with the N11 trenchless crossing.	
HDD7	TX-07 M50 crossing, Sector 4 (see Figure 4)	DLR Cherrywood All-Weather Pitch, Laughanstown. This location is considered to be representative of residential dwellings to the east of the trenchless crossing compound, associated with the M50 trenchless crossing (TX-07 as referenced in Table 3).	122415, 380469

Figure 4 Onshore ECR – monitoring locations

5.6.10 Continuous unattended noise monitoring was undertaken between 12:00 on Thursday 19th September 2024, and 10:00 Tuesday 24th September 2024 and the results of the baseline survey are detailed in full within the Noise and Vibration Technical Baseline Report.

Evaluation of measured baseline noise levels

5.6.11 The measured baseline levels have been evaluated in conjunction with the ABC Method contained in BS 5228-1 to calculate the daytime, evening, and night-tine construction noise threshold limits, which are shown in Table 15.

5.6.12 It should be noted that the measured ambient sound levels have been rounded to the nearest decibel.

Table 15 Evaluation of measured levels and determination of BS5228-1 threshold values, dB

Location (crossing ref)	Period	Lowest Measured Ambient Level $L_{Aeq,T}$	Threshold Value $L_{Aeq,T}$
SH2 (TX-01 + TX-02)	Daytime	48	65
	Evening	47	55
	Night-time	32	45
HDD6 (TX-06)	Daytime	55	65
	Evening	52	55
	Night-time	47	55*
HDD7 (TX-07)	Daytime	49	65
	Evening	48	55
	Night-time	43	50**
* Category C threshold values apply ** Category B threshold values apply			

OSS

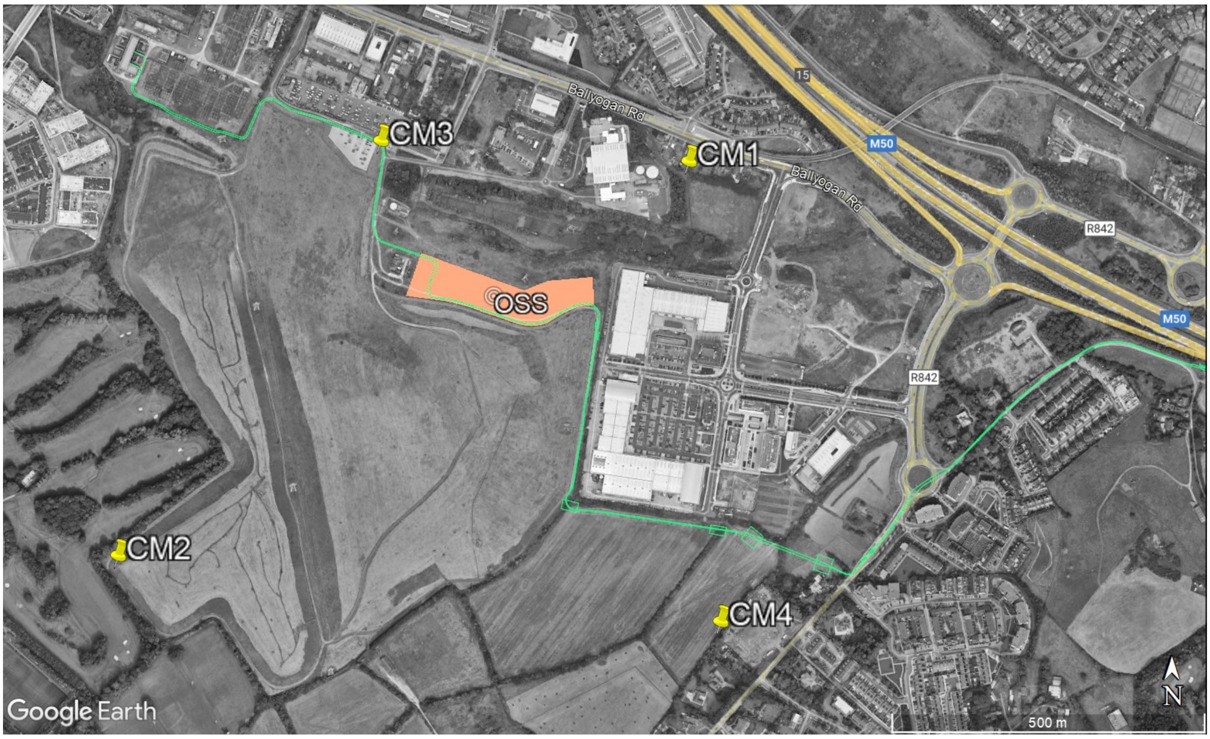
5.6.13 At the proposed OSS, unattended noise monitoring was undertaken at four monitoring locations in Carrickmines (CM), which are considered representative of the closest residential receptors which surround the OSS and grid connection.

5.6.14 The locations are detailed in Table 16 below and shown on Figure 5.

Table 16 OSS: Noise monitoring locations

Receptor	Location	Co-ordinates (x, y)
CM1	To the north of the OSS, adjacent to the rear gardens of residential dwellings located off Ballyogan Road (L6034), Carrickmines.	120887, 381190
CM2	To the south of the OSS, near the Stepaside Golf Course. This location is considered to be representative of residential dwellings on Cruagh Rise.	119998, 380659
CM3	To the west of the OSS, next to the DLR Operations Centre car park. This location is considered to be representative of residential dwellings to the northwest, located off Ballyogan Road (L6034), Carrickmines.	120451, 381266
CM4	To the Southeast of the OSS, in open fields close to the rear garden of residential dwellings located off Glenamuck Road South (R842), Carrickmines, and considered representative of dwellings on Glenamuck Road South.	120980, 380535

Figure 5 OSS: Monitoring location plan



5.6.15 Continuous unattended noise monitoring was undertaken at CM1, CM2, and CM3 between 16:30 on Friday 19th March 2021, and 11:00 Thursday 25th March 2021. At CM4, noise monitoring was undertaken between 11:21, and 05:00 on Thursday 21st December 2023.

5.6.16 The results of the baseline survey are detailed in the Noise and Vibration Technical Baseline Report and summarised below.

Evaluation of measured baseline noise levels

5.6.17 The measured baseline levels have been evaluated in conjunction with:

- The ABC Method contained in BS 5228-1, which is used to calculate the daytime construction noise threshold limits; and
- BS 4142, which is used to assess the background sound levels to be utilised for the operational assessment at the residential receptors.

Construction phase

5.6.18 Noise sensitive receptors situated close to the OSS will potentially be impacted by construction noise, therefore it is necessary to evaluate the measured levels with reference to the BS5228-1 ABC method, as detailed in Annex A Table A1. The lowest measured ambient level at each monitoring location, and the calculated threshold values, are shown in Table 17.

5.6.19 The summary data presented is the median average of the LAeq, LA90 and LA10 and maximum LAmax, during each time period, and have been rounded to the nearest decibel.

Table 17 OSS: Calculated construction noise threshold limits, dB

Receptor	Period	Lowest Measured Average Ambient Level $L_{Aeq,T}$	Threshold Value $L_{Aeq,T}$
CM1	Daytime	44	65
CM2	Daytime	40	65
CM3	Daytime	47	65
CM4	Daytime	40	65

Operational phase

5.6.20 The representative background levels are the lowest LA90 levels during the daytime and night-time periods.

5.6.21 The representative levels which will be utilised for the operational noise assessment of the OSS at the residential receptors, are shown in Table 18.

Table 18 OSS: Representative background sound levels, dB

Receptor	Period	Representative Background Level L_{A90}
CM1	Daytime	36
	Night-time	28
CM2	Daytime	33
	Night-time	30
CM3	Daytime	41
	Night-time	34
CM4	Daytime	37
	Night-time	32

O&M Base

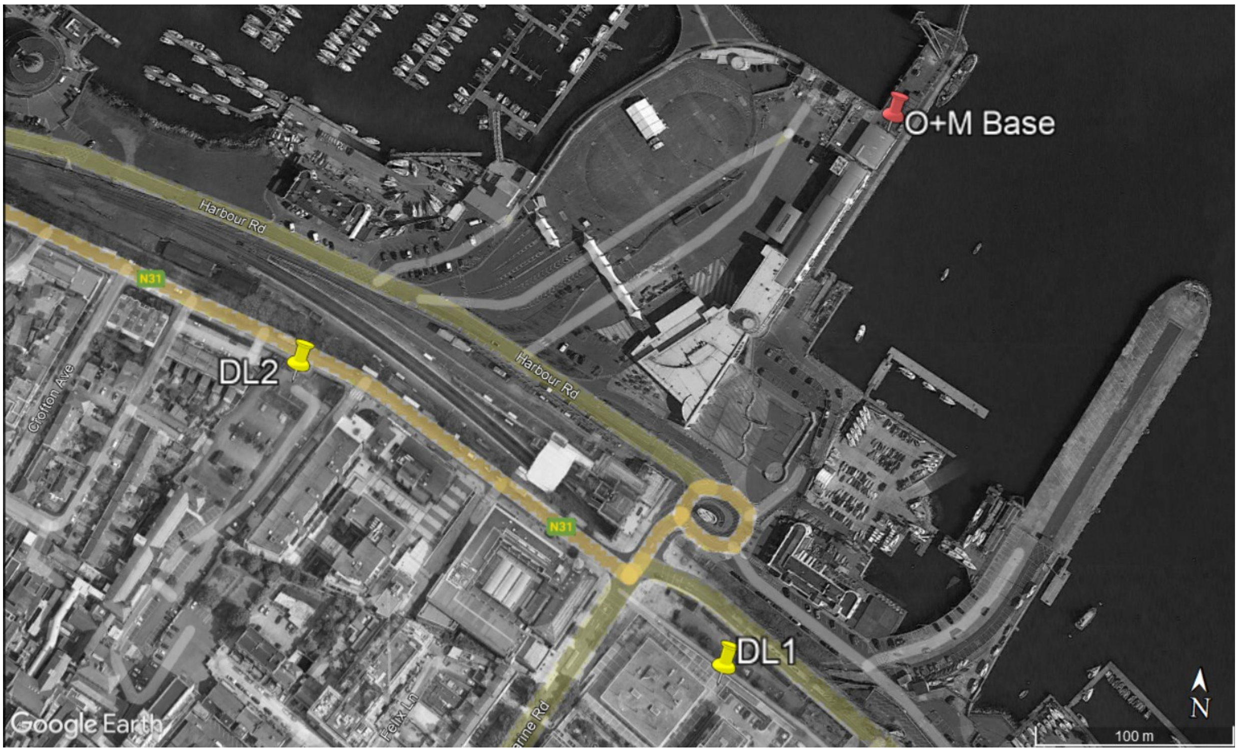
5.6.22 At the proposed O&M Base in Dún Laoghaire Harbour, noise monitoring has been undertaken at two monitoring locations, to the southeast and southwest of the O&M Base site.

5.6.23 The monitoring locations are detailed in Table 19 and shown on Figure 6.

Table 19 O&M Base: Noise monitoring locations

Location	Description	Co-ordinates (x, y)
DL1	Located approximately 290 m to the south of the existing harbour building, outside The Pavilion (theatre) and The Forty Foot (public house), off Marine Road. This location is considered to be representative of nearby residential dwellings at Pavilion Apartments.	124667, 385419
DL2	Located approximately 320 m to the southwest of the Site, within the Crofton Road (N31) public carpark. This location is considered to be representative of nearby residential apartments at Harbour Square.	124444, 385583

Figure 6 O&M Base: Noise monitoring location plan



5.6.24 Attended noise monitoring was undertaken at two locations on 6th and 7th September 2023. At DL1, two periods of monitoring were undertaken during the day (11:48–12:48 and 14:02–15:02) and two during the night (00:36–01:06 and 01:47–02:17). At DL2, monitoring also occurred during two daytime periods (12:56–13:56 and 15:09–16:09) and two nighttime periods (00:00–00:30 and 01:11–01:41).

Construction phase

5.6.25 Noise sensitive receptors located close to the O&M Base will potentially be impacted by construction noise, therefore it was necessary to evaluate the measured levels with reference to the BS5228-1 ABC method, as detailed in Section 5.4. The lowest measured ambient level at each monitoring location, and the calculated threshold values, are shown in Table 20.

5.6.26 The summary data presented is the median average of the L_{Aeq}, L_{A90} and L_{A10} and maximum L_{Amax}, during each time period.

Table 20 O&M Base: Calculated construction noise threshold limits, dB

Location	Period	Lowest measured average ambient level $L_{Aeq,T}$	Calculated threshold value $L_{Aeq,T}$
DL1	Daytime	54	65
DL2	Daytime	60	65

Operational phase

5.6.27 The representative background levels are the median L_{A90} levels set out in Table 20 above, during the daytime and night-time periods.

5.6.28 The representative background sound levels (L_{A90}) which will be utilised for the operational noise assessment of the substation on the residential receptors are shown in Table 21 below.

Table 21 O&M Base – representative background sound levels, dB

Location	Period	Representative Background Level L_{A90}
DL1	Daytime	56
	Night-time	47
DL2	Daytime	65
	Night-time	51

Worst-case approach to establish baseline

5.6.29 As outlined within this section, the baseline noise levels have been utilised to calculate limits for the construction and operational assessments in accordance with the relevant guidance. The limits have been based on:

- The lowest average ambient sound levels measured at the relevant locations for the construction noise threshold limits, in accordance with BS 5228-1;
- the lowest median background sound levels measured at the relevant locations for the operational noise assessment at residential receptors, in accordance with BS 4142; and
- the lowest measured ambient sound levels measured at the relevant location for the operational noise assessment at commercial receptors, in accordance with the IEMA guidelines.

5.6.30 With reference to the above, it is therefore considered a worst-case approach has been adopted regarding the baseline data.

Future receiving environment

5.6.31 The EPA Guidelines (2022) recommends that the assessments should include a description of the likely evolution of the future receiving environment if the project were not to proceed (i.e. the 'do-nothing scenario').

5.6.32 Given the linear nature of the project, the noise environment along the route varies but is predominantly urban, with key sources of noise predominately arising from means of transport including road traffic, the railway, and LUAS light rail operations across different sections. These existing noise sources are not anticipated to increase significantly in future.

5.6.33 With respect to the OES and O&M Base, it is expected that, should the proposed development not proceed (the 'do nothing' scenario), no noise impacts are expected to arise.

5.7 Uncertainties and technical difficulties encountered

5.7.1 The main uncertainties and technical difficulties encountered during the completion of this chapter, and the main assumptions are outlined below. For the purposes of this section, they have been divided into:

- Baseline survey;
- Construction noise and vibration assessment; and
- Operational noise assessment.

Baseline survey

5.7.2 As advised in BS 4142:2014+A1:2019, areas of uncertainty associated with measurements of sound include:

- The complexity and level of variability of the residual acoustic environment;
- The location(s) selected for taking the measurements;
- The distance between sources of sound and the measurement location and intervening ground conditions;
- The number of measurements taken;
- The measurement time intervals;
- The range of times when the measurements have been taken;
- The range of suitable weather conditions during which measurements have been taken;
- The measurement method and variability between different practitioners in the way the method is applied;
- The level of rounding of each measurement recorded; and

- The instrumentation used.

5.7.3 With reference to the above, the measurement uncertainty was minimised during the baseline sound survey as follows:

- Baseline sound measurements were taken at positions representative of the noise-sensitive receptors to the Landfall Site; at three of the eight trenchless crossing locations along the onshore ECR (TX-01, TX-06 and TX-07) , the OSS, and the O&M Base;
- The measurement positions were located away from reflecting surfaces and leafy vegetation as far as reasonably practicable;
- The reliability of the baseline noise survey can be influenced by the number of individual measurements conducted, as this determines the extent to which the acoustic environment is accurately characterised. A limited number of measurements may fail to capture the full variability of the environment, particularly in areas with fluctuating or intermittent noise sources. To ensure the survey results are robust and representative of the actual conditions, the assessment incorporated a combination of short-term and long-term monitoring, designed to address these challenges and reduce uncertainty:
  - Short-term monitoring involved several measurements at each location during various parts of the day, evening, and night, capturing temporal variations across these periods, and included typical midweek and weekend periods; and
  - Long-term monitoring was carried out at the OSS to provide a more comprehensive understanding of the acoustic environment. This approach enabled continuous data collection over several days, capturing fluctuations in noise levels that may occur due to daily patterns, variations in weather conditions, or ambient noise sources. By using long-term monitoring, the assessment accounts for periods of atypical noise events, ensuring a more accurate representation of the baseline environment;
- Appropriate weather websites were consulted for the duration of the survey so any unsuitable weather conditions could be identified and these periods excluded from the monitoring results; and
- The instrumentation was appropriate for the accurate measurement of environmental noise and complied with recognised standards for noise assessment procedures.

5.7.4 Due to COVID restrictions, baseline noise levels measured in 2021 may have been lower than what is typical. However, the necessity of conducting further baseline surveys since 2021 was carefully evaluated, and it was determined that additional surveys were unnecessary. This is because the BS5228-1 construction threshold limits, were derived directly from the lowest measured baseline levels which represent an estimate of worst-case conditions. Using these conservative baseline levels ensures that the assessment remains robust and protective of receptors.

5.7.5 Furthermore, ambient noise levels at most locations were significantly below the BS5228-1 Category A value of 65 dB during the daytime, which is the threshold below which construction noise is generally considered negligible. The 2021 baseline levels therefore align with recognised industry standards and best practices, further supporting the validity of the methodology.

Construction noise and vibration assessment

5.7.6 The assessment is based on the anticipated type, quantity, and size of plant to be required for the purposes of site preparation and construction works. As a working hypothesis, construction predictions have been carried out using guidance set out in British Standard BS 5228-1, reflecting expected worst-case scenarios and indicative timescales. While the predictions provide a robust basis for the assessment, exact construction impacts are difficult to fully quantify due to inherent uncertainties in construction methods, schedules, and plant operation.

5.7.7 Noise and vibration predictions are based on the anticipated programme and construction methods It has been necessary to make assumptions with the advice of the Dublin Array design team regarding some aspects of the construction process, and this are detailed in the assessment below. However, a precautionary approach has been adopted at all times and any assumptions necessitated are based on professional judgement and are reflective of the information available at the pre-planning stage of a project of this scale and nature and is consistent with the level of assessment required within the EIAR.

5.7.8 Further information on the anticipated construction methods and programme is provided in the Project Description Chapter.

Operational noise assessment

5.7.9 Noise modelling for the OSS once operational has been based on the planned layout with the anticipated type, quantity, and size of plant to be required. The final specification of the OSS plant will be confirmed as the project matures. Operational noise at the O&M Base has been scoped out of this assessment, as is detailed within Section 5.8.

5.7.10 The following steps have been taken to address uncertainty, and ensure the operational noise assessment remains robust:

- A worst-case scenario has been modelled, assuming all plant operates simultaneously and continuously, representing the worst-case noise output;
- Conservative assumptions on noise emissions from the proposed equipment have been used, based on similar installations and projects; and
- Embedded features relevant to noise mitigation, such as transformer fire walls, buildings, and boundary walls, have been included in the modelling to minimise potential impacts.

5.8 Scope of the assessment

Scoped in

5.8.1 The following impacts have been identified and assessed:

- Construction
  - Impact 1: Noise impacts from construction activities (including drilling) at the Landfall Site;
  - Impact 2: Vibration impacts from construction activities (including drilling) at the Landfall Site;
  - Impact 3: Noise impacts from construction of the Onshore ECR;
  - Impact 4: Vibration impacts from drilling at trenchless crossings along the Onshore ECR;
  - Impact 5: Noise impacts from construction activities at the OSS; and
  - Impact 6: Noise impacts from construction activities at the O&M Base.
- Operation
  - Impact 7: Noise impacts from operations at the OSS upon residential receptors; and
  - Impact 8: Noise impacts from operations at the OSS upon commercial receptors.

Scoped out from further evaluation in this EIAR

Noise from construction traffic

5.8.2 A detailed assessment of noise from construction traffic associated with all construction works for the onshore infrastructure has been scoped out due to the relatively low projected Heavy Goods Vehicle (HGV) volumes across key locations, including the Landfall Site, Clifton Park and Leopardstown TCCs the ECR, and the OSS. Each of these sites is located within urban areas, where elevated background noise levels and existing traffic movements further reduce the likelihood of significant noise impacts from additional HGV movements.

5.8.3 The sequential and linear construction phases of the ECR, along with low traffic volumes at the TTCs and Landfall, even at peak times, reinforce this conclusion. Traffic generation estimates for the onshore infrastructure are set out in the Traffic and Transport Chapter and comparison with baseline levels are presented there as well.

5.8.4 At the O&M Base, the Onshore Traffic and Transport Chapter states that estimated daily trip generation during the construction phase will comprise of up to 14 HGV movements, and 30 light vehicles movements. However, these activities will primarily occur within the confines of St. Michael's Pier and the adjacent maintenance yard, located within a commercial harbour, which was previously used as a car ferry terminal. While the specific construction traffic may differ from the vehicle movements historically associated with the surrounding area, the site's established use as a commercial harbour indicates it is well-equipped to accommodate such temporary activity without significant disruption character.

5.8.5 Given the limited number of HGV movements and the urban settings of each site, any noise impact from construction traffic is expected to be **short-term** and **negligible**. This supports the decision to scope out a detailed noise assessment for construction traffic across all onshore works.

O&M Base – operational noise

5.8.6 The O&M Base purpose is to provide supporting services (control, monitoring, storage, welfare) for the offshore wind farm during the projects lifecycle. The building has been designed to accommodate offices and control facilities which will be used in connection with the planning and management of the offshore maintenance operations.

5.8.7 The building will also include warehouse storage to store various small equipment which will be used in the maintenance of offshore infrastructure. However, major components like generators, blades, main bearing, blade bearings or spare cable will not be stored on the O&M Base.

5.8.8 Daily operations at the base will include the delivery of spare parts, materials and supplies to the O&M warehouse. There will not be any heavy engineering or manufacturing processes at the site.

5.8.9 Deliveries to site will generally consist of small loads delivered by light goods vehicles (on average 2 deliveries per day) with an occasional HGV expected on rare occasions. Traffic will access the internal O&M Base via the main harbour gates off Harbour Road. Deliveries will be moved to/from the warehouse area using a forklift truck.

5.8.10 Approximately 80 persons will work at the O&M Base, including approximately 25 offshore technicians. Technicians will arrive at the O&M Base, change into clothing/PPE suitable for offshore use, and embark on a CTV moored at the pontoon.

5.8.11 As access to the wind farm is required at all times, the O&M Base will need to be accessible 24 hours per day, 7 days per week. However, normal operating hours will typically involve a shift pattern of 0800 to 1800 hrs for office staff and 0600 to 2000 hrs for the offshore technicians. There will not be any planned deliveries to the O&M Base after 1800 hrs. There will be limited activity outside of these hours which include access to the building by office staff and the engineering staff. However, during periods of wind farm outage and other periods of high workload there may be a need for shifts to operate up to 2200 hrs.

5.8.12 The operational activities at the proposed O&M Base are anticipated to involve low-noise activities, such as maintenance tasks, administrative work, and vehicle movements, which is typical of a commercial harbour setting. Given the nature of these operations and the characteristics of the surrounding area, a detailed BS 4142 assessment of operational noise has therefore been scoped out.

5.8.13 BS 4142:2014+A1:2019 provides a method for assessing the impact of industrial and commercial sound by comparing the specific sound level from a source with the background noise level (L_{A90}). The representative background sound levels at the nearest receptors, as detailed in the Noise and Vibration Baseline Report, are as follows:

- DL1: 56 dB $L_{A90,T}$ (daytime), 47 dB $L_{A90,T}$ (night-time); and
- DL2: 65 dB $L_{A90,T}$ (daytime), 51 dB $L_{A90,T}$ (night-time).

5.8.14 The likelihood of operational noise at the receptors exceeding these levels by a significant margin is **low** for the following reasons:

- The O&M Base will be located over 290 m from the nearest noise-sensitive receptors, with intervening land comprising transportation, commercial, and mixed-use activities, which naturally contribute to the background noise environment;
- The operations proposed at the O&M Base are in keeping with the commercial harbour environment, and the low-noise nature of activities is unlikely to result in a specific sound level significantly above the existing background noise; and
- Due to the low likelihood of operational noise emissions from the O&M Base, the specific sound level is not expected to be out of character or contribute meaningfully to the overall noise environment at the nearest receptors.

5.8.15 Given the minimal potential for noise emissions from the O&M Base operations, combined with the moderate background sound levels and substantial separation distance, the impact is likely to be **negligible**. Therefore, a detailed BS 4142 assessment has not been included within this assessment.

Landfall and Onshore ECR – operational noise

5.8.16 At the Landfall Site and the Onshore ECR, all infrastructure will be situated underground and requires no operational plant or equipment. The absence of operational plant or activities traditionally associated with noise generation eliminates the need to assess operational noise impacts, and therefore this has been scoped out of this chapter.

OSS – operational vibration

5.8.17 The OSS does not contain any mechanically moving parts that are capable of generating the energy required to transmit such levels of vibration to the receptors which are located a minimum of 150 m from the boundary. Therefore, operational vibration has been scoped out of this chapter.

5.9 Key parameters for assessment

5.9.1 The onshore infrastructure key design parameters used in the EIA are set out in the Project Description Chapter.

5.9.2 For each of the impacts 'Scoped-in' to the assessment (and as described in the preceding Section 5.8) the relevant key design parameters have been used in assessing the impact.

5.9.3 The key design parameters in Table 22 have been selected as those having the potential to result in the greatest effect on an identified receptor or receptor group. Following this, the likely significant effects on receptors from the key design parameters have been described and assessed. Table 22 presents the construction methodology for each of the Impacts.

5.9.4 As the key design parameters are the parameters with the greatest potential for change to the relevant receptor or receptor group, confidence can be held that development of any construction methodology options will give rise to no worse effects than assessed in this impact assessment.

Table 22 Key project design parameters

Potential impact	Design parameter assessed	Justification
Construction phase		

Impact 1: Noise - impacts from construction activities (including drilling) at Landfall Site	This considers noise impacts from all construction works, including enabling works, trenchless drilling, installation, and reinstatement activities at the Landfall Site. It assumes:
	▪ All plant associated with construction activities operating simultaneously within the Landfall site, with the noisiest activity selected for assessment;
	▪ Simultaneous operation of the piling rig for TJB installation, and the noisiest construction activity;
	▪ Trenchless installation will be undertaken, which will require continuous operations.
	▪ Noise mitigation measures include:
	  ▪ 3.5 m high acoustic fencing (i.e. close boarded fence/plywood hoarding) around the southern and western perimeters of the Landfall Site;
	  ▪ Shipping containers stacked two high (5.2 m total height) erected around drilling rig to mitigate nighttime noise impacts at the nearest NSRs.
	▪ Once the Landfall Site and access are established, the next phase will involve installing the offshore export cable ducts beneath the beach and cliffs. The TCC will be used for the entire duration of the Onshore ECR construction works.
	▪ A temporary trenchless crossing compound measuring approximately 20 m x 15 m will be established within the Landfall Site TCC which will contain essential equipment.
		Key considerations include:
		▪ Proximity to receptors: Construction activities occurring closest to receptors will result in higher noise impacts due to reduced attenuation over distance.
		▪ Simultaneous operations: The simultaneous operation of the piling rig and other plant increases overall noise levels, representing a worst-case scenario.
		▪ Continuous drilling: Geological constraints at specific crossings necessitate continuous operations during both daytime and nighttime subject to approval of the planning authority
		▪ Working outside normal hours may also be necessitated through considerations of safety or weather and sub-contractor availability. Extended construction activities will be carried out in consultation with DLRCC.
		▪ Mitigation measures: Acoustic barriers which will include the installation of fencing and/or containers or suitable alternative which have the ability to avoid noise impacts at the nearest NSRs. The measures to be deployed will provide screening and limit noise propagation.
		▪ Conservative modelling: The assessment assumes worst-case noise levels for trenchless crossing activities, ensuring impacts are not

Potential impact	Design parameter assessed	Justification
	▪ Two trenchless techniques—Horizontal Directional Drilling (HDD) or the Direct Pipe Method (DPM)—are suitable for this installation. The construction methodology for both is described in the Project Description Chapter; however, either method will result in similar noise impacts. Since only one method will be used, HDD has been assessed as the representative scenario.	underestimated. DPM and HDD methodologies are considered comparable in terms of their grouped noise impacts, ensuring a robust and precautionary assessment.
Impact 2: Construction vibration impacts from construction activities (including drilling) at the Landfall Site	Trenchless drilling will be carried out at the Landfall Site for the installation of the offshore export cable ducts under the cliffs and beach. The assessment assumes the associated drill rig will be positioned approximately 80 m from the closest NSR. Continuous 24/7 drilling operation has been assessed at this location. Two TJBs will be constructed within the Landfall site TCC. Each TJB will require an underground concrete plinth, which will be constructed side by side within an excavated pit. The sides of the pit will be angled safely at 45°, or temporarily braced using trench support or sheet piling. A vibratory sheet piling may potentially be required for the above temporary works at the TJBs.	Trenchless drilling will entail the use of an underground drilling technique which has the potential to cause vibration impacts at the receptors closest to the rig and/or along the ECR. Vibratory sheet piling, if required, has the potential to generate levels of transient vibration, compared to other types of construction methods. However, the project description presents limited use of sheet piling in the construction programme.
Impact 3: Noise impacts from construction of the Onshore ECR	There will be a temporary trenchless crossing compound established either side of the trenchless crossings along the Onshore ECR. The drill rig will be established at the entry pit. Trenchless drilling modelled as an area source within entry pit. The area source will generate the total noise level from all trenchless drilling operations, with drilling only occurring during daytime hours at most locations.	Working outside normal hours may be necessitated through considerations of safety or weather and sub-contractor availability. Exceptional construction activities will be carried out in consultation with DLRCC. While ground conditions are not yet fully understood, continuous operations are being sought to ensure safe working conditions. Due to certain ground and geological factors, maintaining operations is considered optimal as halting or intermittently stopping drilling

Potential impact	Design parameter assessed	Justification
	24/7 drilling operations have been assessed at the specific trenchless crossings TX-01, TX-06 and TX-07.	could lead to instability or increased risks associated with changing ground conditions. Continuous operations minimise these risks, preserving bore integrity and providing more control over ongoing activities. However, it is acknowledged that full operations, are not consistently feasible during the nighttime period, and certain operations (i.e. HGV movements) will be limited, or adjusted accordingly.
Impact 4: Vibration- drilling operations at trenchless crossings at the onshore ECR	Trenchless drilling will be carried out at eight crossing locations along the Onshore ECR. Assessment assumes drilling rig will be positioned at the proposed entry pit of the trenchless crossing compounds.	Trenchless drilling operations could cause vibration impacts at the receptors closest to the entry pit. Prediction calculations have been based upon industry guidance and published studies.
Impact 5: Noise impacts from construction at the OSS	The assessment focuses on the loudest construction phase and the individual plant required within that phase, rather than modelling all construction phases simultaneously. For this assessment, noise levels from the most significant phase, such as site preparation works (e.g. excavation, grading, and levelling), have been predicted and selected for use in the assessment. This approach ensures that the assessment considers the peak noise impact likely to occur at the OSS. By selecting the noisiest construction phase, the assessment provides a robust and precautionary evaluation of noise impacts on nearby receptors.	Assessing the loudest construction phase provides a robust and representative evaluation of potential noise impacts at receptors. This method avoids unnecessary overestimation from modelling all phases simultaneously, while ensuring that the worst-case noise levels likely to occur are considered.
Impact 6: Construction noise and vibration- O&M Base	Predictions of ground borne vibration based on Table E.1 of BS 5228-2. Vibration to assess expected noise and vibration impacts during construction, including potential short-term activities such as piling and excavation.	The closest NSRs are over 290 m from the site, within a busy urban environment adjacent to transport infrastructure. The O&M will be located within an existing harbour, adjacent to existing commercial uses. Construction activities are likely to generate higher

Potential impact	Design parameter assessed	Justification
		noise or vibration levels, but are expected to be short-term and localised.
Operational phase		
Impact 7: Noise impacts from operations at the OSS upon residential receptors	Noise levels from the OSS have been predicted at the nearest residential receptors. The modelling has been undertaken on the basis of the type, quantity and size of plant that will be used at the OSS. Noise modelling has been undertaken on the basis of the design and layout of the proposed OSS, along with the quantity and size of plant that is likely to be required. The final specification of the OSS plant has not been finalised, but will be as per EirGrid functional specification: OFS-SSS-417-R1 Onshore Compensation Compound (OCC) Civil and Building Works. The operational noise levels of the plant associated with the OSS is based on information provided by the Applicant, other similar projects. Predictions of operational noise have assumed that all the plant associated with the OSS will be operating 24/7.	Noise modelling considers the design and layout of the proposed OSS, along with information provided by the Applicant and data from similar projects. Predictions assume 24/7 operation of all plant and equipment.
Impact 8: Noise impacts from operations at the OSS upon commercial receptors	Noise levels from the OSS predicted at the nearest commercial receptors. All plant associated with the OSS operating 24/7.	Conservative assessment assumes continuous operation of all OSS plant, considering that the final substation design has not been confirmed, ensuring worst-case scenario for commercial receptors.

5.10 Project Design Features and Other Avoidance and Preventative Measures

5.10.1 As outlined within Volume 2, Chapter 3: EIA Methodology and in accordance with the EPA Guidelines (2022), this EIAR describes the following:

- Project Design Features: These are features of the Dublin Array project that were selected as part of the iterative design process, which are demonstrated to avoid and prevent potential adverse effects on the environment in relation to noise and vibration. These are presented within Table 23;
- Other Avoidance and Preventative Measures: These are measures that were identified throughout the early development phase of the Dublin Array project, also to avoid and prevent likely significant effects, which go beyond design features. These measures were incorporated in as constituent elements of the project, they are referenced in the Project Description Chapter of this EIAR and they form part of the project for which development consent is being sought. These measures are distinct from design features and are found within the suite of management plans. These are also presented within Table 23; and
- Additional Mitigation: These are measures that were introduced to the Dublin Array project after a likely significant effect was identified during the EIA assessment process. These measures either mitigate against the identified significant adverse effect or reduce the significance of the residual effect on the environment. The assessment of impacts is presented in Sections 5.11, 5.12 and 5.13 of this EIAR chapter.

5.10.2 All measures are secured within Volume 8, Chapter 2: Schedule of Commitments. Alternative configurations of noise control measures that will provide equivalent noise reductions may deployed when there is greater certainty on the proposed construction operations with the advancement in detailed design and project planning. This will be agreed in consultation with the planning authority as the project advances.

Table 23 Project design features and other avoidance and preventative measures relating to noise and vibration

Project design feature/Measure	Where secured
Project design features	
Routing of the onshore ECR and site selection of the Landfall Site, OSS and the O&M Base has avoided key areas of sensitivity where possible. The proposed O&M Base and OSS are both located within established commercial areas.	Project Description Chapter
Avoidance and preventative measures	
A planning stage CEMP has been included with the application for development consent and is included in Volume 7, Appendix 8. The purpose of the planning stage CEMP is to set out the measures which will be taken to manage the potential environmental impacts of the onshore construction of Dublin Array and limit the disturbance from onshore construction activities such as site preparation, material delivery and removal, works activities and site reinstatement as far as is reasonably practicable. The CEMP is a planning stage document that, by reference to the assessments reported in the Environmental Impact Assessment Report (EIAR), sets out the key construction stage environmental commitments. The final construction stage CEMP will be sent by the Applicant to the Planning Authority for agreement, as a condition of the development consent. Potentially noisy construction equipment and plant will be sited away from noise and/or vibration sensitive receptors, as far as reasonably practicable. There will be a preference for the use of construction plant that will emit lower noise levels (such as plant fitted with effective silencers and noise insulation), as far as reasonably practicable. Where possible, works will limit the use of particularly noisy plant at certain times, i.e. do not use particularly noisy plant at night as far as reasonably practicable. A multi-channel communication feedback strategy will be implemented. This will include advance notification of activities likely to generate perceptible noise or vibration, such as trenchless crossings. Notifications will be delivered through targeted communications for key receptors (e.g. residential dwellings) and accessible methods such as a project website. The strategy will ensure adequate notice periods, regular updates, and open channels for addressing community concerns, thereby establishing trust and reducing the likelihood of complaints.	Volume 7, Appendix 8: Onshore CEMP.

Project design feature/Measure	Where secured
Landfall Site – noise from construction activities To reduce the impacts arising from the construction noise at the Landfall Site, a temporary 3.5 m high acoustic barrier (i.e. close boarded fence/plywood hoarding), will be installed around the southern and western perimeters of the Site. The barrier will remain in-situ for the duration of the construction phase.	Project Description Chapter
Landfall Site – noise from trenchless drilling operations To mitigate noise from trenchless drilling operations during the nighttime, the following measures have been included: ▪ The use of shipping containers stacked two high, arranged in an L-shape around the drilling rigs, creating a temporary acoustic fencing with a total height of 5.2 m. This indicative configuration reduces direct noise transmission to nearby receptors by blocking line-of-sight noise propagation. ▪ A 3 m high acoustic barrier (i.e. close boarded fence/plywood hoarding) located around the pumping and mixing plant associated with drilling operations. The location of this barrier, provides targeted noise reduction for these specific sources. ▪ The steel construction of the shipping containers is particularly effective in reflecting and attenuating airborne sound generated by drilling equipment. This approach is highly practical, as shipping containers are readily available, cost-effective, and can be quickly deployed, making them an ideal solution for temporary operations such as trenchless drilling. If required at the landfall site, a temporary fence or barrier 3 m in height, constructed with sufficient surface mass (15 to 20 kg/m) and designed to meet local constraints can be used as a suitable noise barrier. If required at the landfall site, the use of low-noise plant and equipment could be employed to reduce noise levels at surrounding sensitive receptors, with the effectiveness of this measure assessed in relation to the required barrier height.	Project Description Chapter
Trenchless crossing locations: Acoustic fencing (i.e. close boarded fence/plywood hoarding), will be located around the perimeter of the trenchless crossing compound, with the following heights: ▪ TX-07 and TX-08, 2.5 m high. ▪ A 3 m high acoustic barrier (i.e. close boarded fence/plywood hoarding), located around the perimeter of the trenchless crossing compounds at TX-03, TX-04, TX-05, and TX-06.	Project Description Chapter

Project design feature/Measure	Where secured
If required at the trenchless crossing locations, the use of low-noise plant and equipment could be employed to reduce noise levels at surrounding sensitive receptors, with the effectiveness of this measure assessed in relation to the required barrier height.	
Clifton Park TCC (TX-01) Clifton Park TCC will accommodate the entry pits for both TX-01 and TX-02. As noted above at the Landfall Site, crossing TX-01 also includes the use of shipping containers stacked two high, erected around the drilling rig, with a total height of 5.2 m.	Project Description Chapter
Operational noise from the OSS To mitigate noise impacts, the following features of the OSS design provide additional benefits: ▪ A 4 m high masonry wall (as measured from ground level within the OSS) with stone cut cladding will secure the perimeter of the OSS with 4 m high timber gates at the access points. Although primarily included for other purposes, this continuous barrier offers effective noise reduction by blocking direct line-of-sight propagation to nearby receptors. ▪ Additionally, a 10 m high fire wall will be installed around the transformers. While its primary function is fire protection, this structure provides significant noise attenuation for these specific noise sources, further minimising potential impacts on sensitive receptors. These design elements, though not specifically implemented for noise control, contribute to the overall mitigation of noise impacts, enhancing the acoustic environment around the OSS.	Project Description Chapter

5.11 Environmental assessment: Construction phase

Construction plant noise levels

5.11.1 The methods used to predict noise and vibration effects from construction sites rely heavily on specific details. This includes the type and quantity of machinery in use, their positions within the proposed site, and the duration of their operation.

5.11.2 With Dublin Array not yet at final detailed design stage, the confirmed construction plant, and subsequent operational noise levels and associated on-times[1] for all the construction activities/operations will not be confirmed prior to consent. However, a list of indicative construction plant and the associated noise levels 'on-times' for construction activity/phase has been provided by the Applicant and is presented in Annex B.

5.11.3 A precautionary approach has been adopted, based on professional judgement, to identify the indicative levels and ensure that conservative noise levels and on-times are considered in the assessment for the planning phase of Dublin Array.

5.11.4 Using the information provided, the combined sound power level (SWL) has been calculated for the construction activity, and includes machinery and equipment to be used together with associated on-times, and is detailed in Table 25.

5.11.5 Table 24 and Table 25.

Table 24 Combined sound power levels – construction plant used, dB

Activity	Combined Sound Power Level (SWL)
1. TCC Site Preparation, Including Fencing, access road construction topsoil strip, and establish TCC.	120
3. TJB excavation (Landfall)	116
4. TJB wall and base construction (Landfall)	114
5. Joining cables in TJB (Landfall)	115
6. Roof and backfill over TJB (Landfall)	118
7. Pulling and Connection of Cables (Landfall)	114
8. Backfill over Joint Bay (Landfall)	118
9. TCC operations	109
10. Daytime operations within trenchless drilling compound (including drilling)	103
11. TJB Sheet steel piling – vibratory (Landfall)	116

Table 25 Combined sound power levels – construction plant for OSS, dB

Activity	Combined Sound Power Level (SWL)
1. Site Preparation, Including Fencing, Haul Road Construction and Topsoil Strip	123
2. Building Foundation	119
3. Access Road and Carparks	116
4. Building Fabric and High Voltage Plant	118

[1] The periods of operation of the plant at a development site, known as the 'on-time'.

Nighttime drilling operations

5.11.6 There will be a requirement for trenchless drilling to continue to operate during the evening and nighttime period, However the proposed operations within the trenchless crossing compound will be reduced to a minimum, and activities will be limited to those necessary for the safe and effective continuation of the drilling process. The requirement for any drilling operations outside normal working hours will be subject to agreement with DLRCC.

5.11.7 Noise-generating equipment will be selected and positioned to minimise noise emissions at NSR's, and all machinery and equipment will be operated in accordance with best practicable means to reduce noise impact.

5.11.8 Table 26 below, details the sound power level (SWL) associated with the equipment used during trenchless drilling operations, during the evening and night-time periods. It outlines the specific equipment required during these periods, and the corresponding SWL and assumed operating heights, forming the assumptions used for assessing potential noise impacts during these periods. Final confirmation of the details in Table 26 will be undertaken in advance of commencement of drilling operations.

Table 26 Sound power levels – night-time drilling operations

Construction plant	Sound Power Level (dB, SWL)	Height (m)
HDD rig	95	2
Drill generator	95	1
Mixing tank	98	2
Recycling tank	93	2
Mud pump x 2	95	1
Generator	90	1

Construction vibration

5.11.9 Accounting for the distance between the closest receptor and the assumed location of construction activities (at their closest approach), it is unlikely that activities which will give rise to significant vibration effects will arise.

5.11.10 Ground level plant such as excavators or dump trucks, are not considered to generate significant levels of vibration, and will be below the levels which will likely cause cosmetic damage. Notwithstanding this, construction vibration activities have been considered including sheet piling and trenchless drilling operations. The potential vibration impact of these working methods has been assessed upon the closest residential receptors.

Impact 1: Noise from construction activities (including drilling) at the Landfall Site

5.11.11 The two offshore export cables will come ashore at the Landfall Site, located at Shanganagh Cliffs to the south of the Uisce Éireann Shanganagh Wastewater Treatment Plant (WWTP), where they will connect to the Onshore ECR in two underground TJBs.

5.11.12 A temporary construction compound (TCC) will be established at the Landfall Site for the TJB installation and work associated with trenchless installation techniques for the onshore and offshore export cables.

5.11.13 The Landfall Site TCC will initially support the construction activities associated with the TJBs and trenchless crossings. The entry pit for the trenchless crossing underneath the cliffs and beach will be located within the Landfall Site TCC. The TCC will also be used for the full duration of the onshore ECR construction phase.

5.11.14 The exit pit for the trenchless crossing under the DART/railway line (TX-01 as per Table 3) will similarly be located within the Landfall Site TCC (and is considered separately with Impact 3: Noise from construction of the Onshore ECR). The internal layout will be adapted to allow for execution of the required activities during the construction phase. Once the cable ducts and TJBs have been installed, the Landfall Site TCC will operate as a storage TCC to support the onshore ECR construction activities.

Noise model

5.11.15 The Landfall TCC will accommodate and facilitate the necessary construction activities/phases as detailed below. The combined SWL has been calculated for each activity, as detailed in Table 25.

5.11.16 Table 24 above.

5.11.17 The **daytime** construction noise models for the Landfall Site have assumed the following:

- Daytime assessment assumes a worst-case scenario, with the loudest activity occurring simultaneously with piling operations.
- All the plant and equipment associated with site preparation (the noisiest activity) has been modelled as an area source, within the total area of the trenchless drilling compound, and with a height of 2 m;
- The piling rig has been modelled at the TJB, and assumed to be operating simultaneously with the noisiest activity described above;
- The model includes the provision of temporary 3.5 m high acoustic fencing (i.e. close boarded fence/plywood hoarding), which will be constructed along the southern and western boundaries of the Landfall Site TCC;
- Daytime receptor height of 1.5 m representative of noise levels at ground floor level during the daytime;

- The model includes a ground absorbency factor of 0.8, between the source and the receivers; and

- Downwind propagation between the source and the receivers.

5.11.18 Once the Landfall TCC and access road are established, the next phase will involve installing the offshore export cable ducts beneath the beach and cliffs using trenchless technique; HDD or DPM. The construction methodologies for both are described in the Project Description Chapter. Either method will result in similar noise impacts, however, for the purposes of the noise model, data from HDD has been used.

5.11.19 At Landfall, continuous daytime and nighttime operations are being sought to ensure safe working conditions. Due to certain ground and geological factors, maintaining operations is considered optimal, because halting or intermittently stopping drilling could lead to instability, or increased risks associated with changing ground conditions. Continuous operations minimise these risks, preserving bore integrity and providing more control over ongoing activities.

5.11.20 With regards to **evening** and **nighttime** operations, this will include trenchless drilling activities. Consequently the night-time predictions have utilised the construction plant detailed above in Table 26. Drilling operations modelled at the Landfall Site TCC, includes;

- Construction activities during the evening and night-time period, will be limited to those associated with trenchless drilling operations only;

- It is proposed for noise reduction to use shipping containers stacked two high, erected around the drilling rig at the entry pit, with a total height of 5.2 m. These have been arranged in an L-shape, with a total length of 60 m; and

- The use of 3 m high temporary acoustic fencing, around the pumping and mixing plant associated with drilling operations is proposed. This will be arranged in an L-shape, with a total length of 40 m.

5.11.21 The predictions also take into account the relevant Project Design Features and Other Avoidance and Preventative Measures detailed in Table 23. Alternative configurations of noise control measures that would provide equivalent noise reductions may be used when there is greater certainty on the proposed operations with the advancement in detailed design. This will be agreed in consultation with the planning authority.

Receptors

5.11.22 Based on the above, the worst-case noise levels from construction activities associated with construction phase activities at the Landfall Site, have been predicted at the nearest NSRs.

5.11.23 The NSRs considered are shown in Table 27, and includes the representative baseline monitoring location, and the distance from the receptor to the closest working area.

Table 27 Landfall Site construction noise – Noise sensitive receptors

NSR	Description	Co-ordinates (x, y)	Representative monitoring location	Distance to working area (m)
SHN1	Shanganagh Cliffs	325876, 223050	SH2	10
SHN2	Shanganagh Cliffs	325888, 222904		130
SHN3	Shanganagh Cliffs	325909, 222776		260
SHN4	Seafield	326041, 222597	SH1	460

5.11.24 The locations of the NSRs described above are shown on Figure 7 below.

Figure 7 Landfall construction noise – NSR location plan

Predicted noise levels

5.11.25 The predicted noise levels from worst-case construction activities during the daytime are shown in Table 28.

5.11.26 The predicted noise levels from trenchless drilling operations during the evening and night-time period, are shown in Table 28 below, and the noise model outputs are shown in Annex C. The table compares the predicted noise levels, to the calculated threshold limits, with reference to Table 4, Table 7, and Table 11, which define the sensitivity, level of effect and significance.

5.11.27 The table presents a conservative assessment approach which assumes the worst case scenario of site preparation activities being undertaken at the same time as TJB Piling. Paras 5.11.28 and 5.11.29 explain why this scenario is very unlikely to occur.

Table 28 Landfall Site construction noise – Daytime assessment, dB $L_{Aeq,T}$

NSR	Worst-case construction activity	Period	Predicted noise level	Threshold limit	Difference	Impact magnitude	Level of effect and significance
SHN1	Site preparation works; TJB Piling	Daytime	69	65	+4	Medium	Moderate (Not significant)
SHN2			62	65	-3	Negligible	Not significant
SHN3			61	65	-4	Negligible	Not significant
SHN4			58	65	-7	Negligible	Not significant

Table 29 Landfall Site construction noise – Trenchless drilling evening and night-time assessment, dB $L_{Aeq,T}$

NSR	Construction activity	Period	Predicted noise level	Threshold limit	Difference	Impact magnitude	Level of effect and significance
SHN 1	Nighttime drilling operations	Evening	44	55	-11	Negligible	Not significant
		Night		45	-1	Negligible	Not significant
SHN 2		Evening	38	55	-17	Negligible	Not significant
		Night		45	-7	Negligible	Not significant
SHN 3		Evening	33	55	-22	Negligible	Not significant
		Night		45	-12	Negligible	Not significant
SHN 4		Evening	31	55	-24	Negligible	Not significant
		Night		45	-14	Negligible	Not significant

Assessment of daytime operations

5.11.28 The noise predictions undertaken for the daytime period have assumed a worst-case scenario where the loudest construction activity, site preparation works, is undertaken alongside piling operations for temporary works at the TJBs (if piling is required). However, it is not anticipated these activities will be undertaken concurrently. The construction programme will require establishment of the access track in advance of any piling activity. Site preparation will need to be completed in advance of any piling operations commencing, particularly the access track from the main road to the Landfall Site TCC, to enable piling equipment to access the works area. Therefore, both activities are very unlikely to occur simultaneously.

5.11.29 The assessment, therefore, represents a conservative evaluation of the worst-case noise levels that could be experienced at the NSR, ensuring that potential noise impacts are not underestimated. This approach accounts for variations in construction operations and activities, meteorological factors, and receptor sensitivity, thereby providing a robust basis for decision-making.

5.11.30 Furthermore, alternative noise mitigation measures have been explored, including the use of a higher acoustic fencing. However, detailed modelling and analysis, indicate that such measure will provide only a negligible reduction in noise levels at the NSR. This is primarily due to factors such as the noise propagation paths, diffraction effects, and the positioning of the source and receptor. As a result, additional mitigation beyond the proposed measures will not materially alter the noise impact at the NSR.

5.11.31 If the site preparation works and piling at TJB locations did occur concurrently, SHN1 may experience a **Moderate** adverse effect due to a short-term exceedance of the threshold limit by +4 dB. At SHN2, SHN3, and SHN4, the predicted noise levels are expected to be below the threshold value.

5.11.32 In line with best practice, providing prior warning and clear explanations to residents is critical in managing the perception of noise impacts at SHN1, where the closest residential dwelling is located approximately 10 m from the Landfall Site TCC boundary. The Draft Revised Wind Energy Development Guidelines (WEDGs) highlights the importance of transparent and proactive communication with affected communities. Advance notification of construction activities, such as trenchless drilling, will include details on the timing, duration, and nature of the works, as well as the expected noise levels. Ensuring residents are informed can significantly reduce the likelihood of complaints and foster trust between the project team and the community.

5.11.33 With reference to Table 28, construction noise could exceed the threshold value of 65 dB, by up to 4 dB at the NSRs closest to the Landfall Site TCC. In the worst-case, this will lead to a **short-term Medium adverse** impact magnitude on **Medium** sensitivity receptors, equating to a **Moderate** level of effect, which is considered **not significant** in EIA terms, due to the conservative nature of the assessment methodology noting the assumptions made in paragraphs 5.11.28 and 5.11.29.

Assessment of evening and night-time operations

5.11.34 The noise predictions undertaken for the evening and night-time trenchless drilling operations have taken a conservative approach using worst case assumptions where operations are continuous.

5.11.35 Mitigation measures have been included as part of avoidance and preventative measures, to reduce significant noise impacts during the evening and night-time. This includes the use a 5.2 m high barrier around the rigs, and low noise pumps and generators. In addition to these measures, clear and proactive communication with residents remains essential to managing the perception of noise impacts. Providing advance notification of the timing, duration, and nature of the works, in line with the Code of Practice for Wind Energy Development in Ireland: Guidelines for Community Engagement, will further help reduce the likelihood of complaints and maintain trust with the community.

5.11.36 With reference to Table 29, construction noise is not expected to exceed the threshold value at the NSRs. In the worst-case, this will lead to a **Negligible** impact magnitude on **Medium** sensitivity receptors, equating to a **not significant** level of effect, which is considered **not significant in** EIA terms.

Impact 2: Vibration from construction activities at Landfall Site (including drilling)

5.11.37 The assessment of construction vibration at the Landfall Site focuses specifically on two activities which have the potential to generate notable vibration impacts: Drilling operations, and sheet piling. Other potential sources of vibration, such as general construction traffic or minor groundwork activities, are not anticipated to generate perceptible vibration levels that will warrant further consideration (see Table 8 and Annex A). These sources are typically of lower magnitude and unlikely to result in perceptible impacts at the NSRs. Vibration impacts at the Landfall Site are detailed below.

Trenchless drilling operations at Landfall Site

5.11.38 Once the Landfall Site TCC and access are established, the next phase will involve installing the offshore export cable ducts beneath the beach and cliffs using trenchless techniques (HDD/DPM). The construction methodology for both is described in the Project Description Chapter; however, either method will result in similar vibration levels, due to their similar working methods.

5.11.39 A TCC to accommodate the trenchless crossing will be established within the Landfall Site, which will contain essential equipment, including the drill rig, fluid mixing and recycling systems, pumps, and temporary steel casings.

5.11.40 The ground conditions are understood to require sustained mud pump operation, in order to stabilise the borehole and manage challenging conditions, such as loose or unstable soils, until the duct installation is completed. This process will therefore require continuous operations, which will take place over an approximate period of 28 weeks on a continuous basis and will apply to HDD and DPM.

5.11.41 For the purposes of the assessment of Impact 2, it has been determined that the closest VSRs to the drilling works will be the same as Impact 1, and is as follows:

- **SHN1** – Located approximately 80 m from trenchless drilling compound for the entry pit.

5.11.42 Construction vibration impacts to the west of the Landfall Site (at Clifton Park in Sector 1), are considered separately within Impact 5 below.

5.11.43 Desktop predictions of ground borne vibration from trenchless drilling works have been undertaken. These predictions have been carried with consideration of the empirical predictors for ground borne vibration from mechanised construction works, as set out in Table E.1 of BS 5228-2, which includes predictions for "tunnelling."

Predictions using BS 5228-2

5.11.44 BS 5228-2 provides a methodology for predicting vibration levels from tunnelling operations. The standard includes empirical calculations for estimating vibration levels at various distances based on "tunnelling".

5.11.45 However, BS 5228-2 primarily considers tunnelling by larger-diameter tunnel boring machines (TBMs), which typically generate higher vibration levels than the proposed methods such as HDD or DPM. Since these operate at significantly lower power levels and diameters than TBMs, applying the tunnelling-based BS 5228-2 predictions directly to HDD may overestimate the actual vibration impact.

HDD specific predictions

5.11.46 Due to the limitations of applying BS 5228-2 directly to HDD, an alternative prediction methodology has been adopted based on empirical vibration data from HDD operations. Research published by Ciaran C. Reilly (Civil Engineering Research in Ireland, 2020; conference paper: Vibrations due to horizontal directional drilling in Lucan Formation rock and Dublin Boulder Clay) examined predicted and measured vibration levels from HDD operations undertaken to install a pair of cable ducts beneath a light rail line and a busy dual carriageway in Drimnagh, Dublin.

5.11.47 Reilly's study predicted PPV levels using the following equation:

$$v_{res} = 35\, r^{-1}$$

V_{res} = resultant PPV, in millimetres per second (mm/s)

r = distance measured along the ground surface, in metres

5.11.48 Using this equation, Reilly predicted PPV level at a distance of 9 m will be 3.9 mm/s. However, the paper notes that continuous vibration monitoring undertaken during HDD operations found that measured PPV levels were typically below 1 mm/s, indicating that **predicted values significantly overestimated actual vibration levels**. This suggests that the Reilly method provides a conservative estimate of HDD-related vibration impacts.

5.11.49 With regard to the alternative trenchless technique DPM, this involves a comparable bore size and tunnelling methodology to HDD, and the resulting vibration levels are expected to be similar. Empirical data from HDD operations provides a relevant benchmark for assessing likely vibration levels from direct pipe, given the similarities in construction approach and bore size.

5.11.50 Applying Reilly's equation to the current Landfall Site, at a receptor distance of 80 m, the predicted PPV will be **0.4 mm/s**.

5.11.51 Given that the closest VSR considered at the Landfall Site (SHN1) is located over 80 m from the trenchless drilling compound, and based on both BS 5228-2 and Reilly's research, it is reasonable to conclude that PPV levels at SHN1 will be less than 1 mm/s (**Low** impact), and likely below 0.3 mm/s (**Negligible** impact). This conclusion is supported by the fact that PPV levels rapidly decay with distance, and the conservative nature of the Reilly's predictions.

5.11.52 BS5228-2 states that vibration levels between 0.3 and 1.0 mm/s may be perceptible, but *'can be tolerated if prior warning and explanation has been given to residents'.*

5.11.53 The Draft Revised WEDGs highlight the importance of transparent and proactive communication with affected communities. Advance notification of construction activities, such as trenchless drilling, will include details on the timing, duration, and nature of the works, as well as the expected noise levels. Ensuring residents are informed can significantly reduce the likelihood of complaints and foster trust between the project team and the community.

5.11.54 With regards to night-time operations, BS 5228-2 highlights that sensitivity to vibration at different times of the day is far more complex than sensitivity to noise. The human body's sensitivity to vibration varies according to the direction and frequency of the vibration. For temporary construction activities, there are instances where vibration magnitudes, above levels generally associated with a low probability of adverse comment, may still be tolerated. Adverse community reactions are sometimes driven by concerns over building damage, even when the vibration is merely perceptible. It is therefore important to reassure the community that vibration levels must generally be of significant magnitude to cause even cosmetic damage to buildings.

5.11.55 Receptor SHN1 will likely be subject to a worst-case vibration level of less than 0.4 mm/s, and lasting a maximum of 26 weeks in total for the duration of all drilling activity at the Landfall Site. In the worst-case, this will lead to **Low adverse** impact magnitude on **Medium** sensitivity receptors, equating to a **Slight** negative level of effect, which is considered **not significant** in EIA terms.

Piling operations at the TJB

5.11.56 The other potentially significant source of vibration during the construction works at the Landfall Site, will be vibratory sheet piling required for temporary works at the TJBs, and which will only take place during the daytime period.

5.11.57 Depending on the progress rates and techniques employed, vibration effects due to piling installation will be brief and relatively short-lived, in addition, levels of vibration are found to decrease rapidly with distance.

5.11.58 For the purposes of the assessment of Impact 3, it has been determined that the closest VSRs to the trenchless drilling works will be:

- SHN1 – Located approximately 50 m from the Landfall Site TJB.

5.11.59 Desktop predictions of ground borne vibration due to sheet piling have therefore been made in accordance with Table E.1 of BS 5228-2 Vibration. Vibration levels have been predicted using the empirical formulae reproduced in Table E.1, one of which allows the resultant peak particle velocities (PPV) from vibratory piling to be calculated at a specified distance. This can then provide an indicator of the probability of guideline vibration values being exceeded. The calculation is provided below.

$$v_{res} = \frac{k_v}{x^{\delta}}$$

Vres = resultant PPV, in millimetres per second (mm/s)

k_v = Scaling factors (and probability of predicted value being exceeded) = 60 (50%)

x = distance measured along the ground surface, in metres

δ = operational parameter = 1.2 (start up and run down)

5.11.60 The approximate distance between the TJBs and the closest receptors, is 50 m. When using a median scaling factor, and considering start up and run down operations, the predicted vibration level at the VSR will be **0.6 mm/s** (at a 50% confidence level).

5.11.61 At the closest VSRs, this will lead to **Low adverse impact** magnitude on **Medium** sensitivity receptors, equating to a **Slight negative** level of effect, which is considered **not significant** in EIA terms.

Impact 3: Noise from construction of the Onshore ECR

5.11.62 The Onshore ECR connects the TJBs at Shanganagh Cliffs to the OSS located 7.4 km west in Jamestown. The route traverses the townlands of Shanganagh, Hackettsland, Ballybrack, Loughlinstown, Cherrywood, Glebe, Laughanstown, Carrickmines Great, and Jamestown. The route is primarily located on public roads and greenspaces with some sections crossing privately owned agricultural lands.

5.11.63 The proposed Onshore ECR will consist of two separate three-phase 220 kV circuits, each installed in their own parallel underground trench along the 7.4 km route. Each circuit will require associated underground infrastructure, which have been described further in the subsequent sections, and a detailed description and programme of works is described in the Project Description Chapter.

Open cut trenching on public and private roadways, and soft ground

5.11.64 The majority of the proposed infrastructure along the onshore ECR will be installed underground through either standard open-cut trenching or trenchless techniques. There will be manhole inspection covers flush with the existing surface level to access the link box chambers and communication chambers co-located with each underground joint bay (JB) at 600 – 850 m intervals along the ECR.

5.11.65 Apart from the eight trenchless crossing location as set out in Table 3, the Onshore ECR will be installed by standard opencut trenching. This will require the excavation of a trench, using an excavator and removing all of the excavated material. The ducts will be surrounded by imported bedding material and the surface reinstated.

5.11.66 Construction activities for the ECR will include:

- Topsoil removal (in sections on soft ground) or road surface removal (in roads);
- Open cut trench excavation;
- Duct installation;
- Trench backfilling;
- Joint bay installation (every 600 – 850 m along the ECR); and
- Cable pulling and jointing at the joint bays.

5.11.67 For the Onshore ECR, the cables will be installed on a rolling basis. Where no obstacles or constraints exist within or near the ECR, it is expected that progress rates for the trench excavation and installation of ducts for the two circuits will be:

- 20 m linear per day duct install within roads; and
- 40 m linear per day duct install within open greenspace.

5.11.68 These rates will reduce where obstructions and underground utility services are encountered.

5.11.69 Site enabling works are required before construction can commence within each section of the Onshore ECR. These enabling works will include:

- Fencing;
- Utility diversions where required; and

- Establishment of three main TCCs (Landfall Site TCC, Clifton Park TCC (Sector 1) and Leopardstown TCC) which will be operational throughout the Onshore ECR construction phase, including offices, welfare facilities, security, wheel wash, lighting and signage.

Noise from open cut trenching

- Noise arising from open cut trenching works, on the Onshore ECR: Underground Installation:
  - The onshore ECR installation is planned to be undertaken over an 18-month period. The sequential and linear installation method will reduce the impacts of construction activities to one area in the short-term. This will mitigate the potential for any medium or long-term noise disturbances, in specific locations.
- Resemblance to typical utility works:
  - With the exception of the proposed trenchless crossings where drilling technology will be used to cross under significant linear transport networks and watercourses, construction activities associated with the Onshore ECR will resemble those typically undertaken by utility services (i.e. gas, electricity, and telecoms) in residential and urban areas, and will use similar mobile plant and working methods;
  - Given the inherent but temporary noise associated with such construction works, it is reasonable to assume that any noise generated during installation of the onshore ECR will not have a significant adverse impact on the surrounding environment; and
  - All of the standard open cut trenching works will be completed during standard working hours, as agreed with DLRCC.

5.11.70 The level of noise associated with open cut trench works, will vary depending on the separation distance between the construction activities and the closest NSR’s along the corridor (with some receptors located 10 m from the ECR).

5.11.71 The highest noise levels are anticipated when works are conducted in close proximity to dwellings, particularly during activities such as trench excavation. However, these elevated noise levels will be short-term and temporary in nature, as open cut trench works progresses along the corridor, such that it will be no different to typical utility works commonly undertaken along residential streets.

5.11.72 The decision to exclude a detailed noise impact assessment for the Onshore ECR is based on the above key considerations. These collectively support the conclusion that significant adverse noise effects, are unlikely when using this construction method.

5.11.73 During open cut trenching works all the closest NSRs, this will lead to **Low adverse** impact magnitude on **Medium** sensitivity receptors, equating to a **Slight negative** level of effect, which is considered **not significant** in EIA terms.

Noise from trenchless drilling operations

5.11.74 Along the onshore ECR, there are interfaces with significant transport networks and watercourses. In order to avoid disruption and reduce the overall impact of the construction of the onshore ECR, trenchless techniques are proposed to install cable ducts as opposed to standard open-cut trenching. These crossing locations are set out in Table 3.

5.11.75 The noise level generated at the entry pits of the proposed trenchless drilling crossings have been assessed in conjunction with the following:

- Trenchless drilling operations being undertaken within the defined trenchless drilling compounds of the entry pits, at the locations detailed in Table 30;
- Operations at the **exit pit** have not been included within the model, as above ground noise-generating activities are minimal, and primarily involves underground operations, with only intermittent and low-noise surface activities such as duct pulling after drilling has been completed. Any above-ground noise emissions will be **Negligible** compared to the main drilling compound.
- HDD or DPM, will result in similar noise impacts, however, for the purposes of the noise model, data from HDD has been used.
- **Daytime**: Trenchless drilling operations have been considered during the daytime at each trenchless crossing location; and
- **Nighttime**: At the proposed trenchless crossing locations TX-01 (Sector 1), TX-06 (Sector 2) and TX-07 (sector 4) under the railway line, N11 and M50 respectively. The assessment also includes the provision of extending the working hours beyond standard working hours (i.e. during the evening and nighttime periods).

5.11.76 **Daytime** noise level predictions have been made at the nearest NSRs to each of the trenchless crossing locations described below, and are based on the following:

- Each drilling compound has been represented in the noise model as an 'area source,' meaning the noise is distributed evenly across the size of the compound based on the activities expected to take place within it;
- The combined sound power level for drilling operations, has been used (see Table 25.
- Table 24), with an average source height of 2 m;
- A receptor height of 1.6 m, representative of external noise levels in garden areas during the daytime;
- A ground absorption factor of 0.5;
- acoustic fencing (i.e. close boarded fence/plywood hoarding) as set out in Section 5.10, will be located around the perimeter of the all trenchless crossing compounds

5.11.77 **Nighttime** noise level predictions have also been undertaken at the entry pits for TX-01, TX-06 and TX-07 only, and the noise model includes the following:

- Nighttime predictions have utilised the construction plant detailed above in Table 26, with all plant operating at a steady and continuous level;
- A receptor height of 4.0 m, representative of external noise levels at first floor height during the nighttime; and
- In addition to the barriers noted above, crossing TX-01 includes the use of shipping containers stacked two high, erected around the drilling rig, with a total height of 5.2 m, at Clifton Park TCC in Sector 1.

Receptors

5.11.78 The NSRs considered are shown in Table 30. The table also shows the grid co-ordinates, the relevant trenchless crossing location and distance from the receptor to the closest boundary of the trenchless drilling compound.

5.11.79 It should be noted that the NSRs considered are residential properties, and only a single location has been assessed at each trenchless crossing and is based on the closest NSR. Furthermore, crossings TX-01 and TX-02 will utilise the same entry pit within the Clifton Park TCC, therefore the same receptors have been considered.

Table 30 Trenchless crossing locations and NSRs

Trenchless Crossing Ref	NSR	Location	Co-ordinates (x, y)	Distance to closest entry pit (m)
TX-01* (Clifton Park TCC)	HDDN1	Shanganagh Cliffs	125425, 379682	50
	HDDN2.1	Clifton Park, Hackettsland	125332, 379653	60
	HDDN2.2	Bayview Glen, Hackettsland	325605, 223113	80
TX-02 (Clifton Park TCC)	HDDN1	Shanganagh Cliffs	125425, 379682	50
	HDDN2.1	Clifton Park, Hackettsland	125332, 379653	60
	HDDN2.2	Bayview Glen, Hackettsland	325605, 223113	80
TX-03	HDDN3	Bayview Crescent, Hackettsland	125175, 379870	15
TX-04	HDDN4	Norwood, Ballybrack	325219, 223517	15
TX-05	HDDN5	Glencar Lawn, Ballybrack	124826, 380278	30

Trenchless Crossing Ref	NSR	Location	Co-ordinates (x, y)	Distance to closest entry pit (m)
TX-06*	HDDN6	Cherrywood, Loughlinstown	324557, 223424	40
TX-07*	HDDN7	Beckett Park Rd, Laughanstown	122497, 380308	170
TX-08	HDDN8	Happy Valley, Glenamuck Road South (R842), Carrickmines	121098, 380548	40
*Evening and nighttime operations have been considered at these locations i.e. 24hr drilling activities.				

5.11.80 The locations of the NSRs described above are shown in Figure 8 and Figure 9 below.

Figure 8 Trenchless crossings – location of NSRs considered (1 of 2)

Figure 9 Trenchless drilling operations – location of NSRs considered (2 of 2)

Predicted noise levels

5.11.81 The predicted noise levels from trenchless drilling operations during the daytime are shown in Table 31

5.11.82 Table 31. The Table also compares the predicted noise levels to the calculated threshold limits and with reference to the assessment criteria in Section 5.5 of this chapter which defines the level of effect and significance.

5.11.83 It must be noted that where baseline monitoring has not been undertaken, then threshold limits are all based on the lower Category A values, contained in Table 17. As baseline monitoring has not been undertaken at these NSRs, it is considered that this represents a worst-case scenario.

5.11.84 The predicted noise levels from trenchless drilling operations during the evening and night-time period, are shown separately in Table 32, and the noise model outputs are shown in Annex C. Where night-time operations are required, baseline monitoring has been undertaken, and threshold limits set according to the measured values, as detailed within the Noise and Vibration Baseline Report.

5.11.85 The tables compare the predicted noise levels to the calculated threshold limits, with reference to Table 4, Table 7, and Table 11, which define the sensitivity, level of effect and significance.

Table 31 Onshore ECR: Trenchless crossing construction noise; daytime assessment, dB $L_{Aeq,T}$

Trenchless crossing Ref	NSR	Predicted noise level	Period/ threshold limit	Difference	Impact magnitude	Level of effect and significance
TX-01	HDDN1	50	Daytime/ 65	-15	Negligible	Not significant
	HDDN2.1	51		-14	Negligible	Not significant
	HDDN2.2	51		-14	Negligible	Not significant
TX-02	HDDN1	50		-15	Negligible	Not significant
	HDDN2.1	51		-14	Negligible	Not significant
	HDDN2.2	51		-14	Negligible	Not significant
TX-03	HDDN3	58		-7	Negligible	Not significant
TX-04	HDDN4	58		-7	Negligible	Not significant
TX-05	HDDN5	53		-12	Negligible	Not significant
TX-06	HDDN6	50		-15	Negligible	Not significant
TX-07	HDDN7	45		-20	Negligible	Not significant
TX-08	HDDN8	52		-13	Negligible	Not significant

Table 32 Onshore ECR: Noise from trenchless drilling operations –evening and night-time assessment, dB $L_{Aeq,T}$

Trenchless crossing Ref	NSR	Period	Threshold limit	Predicted noise level	Difference	Impact magnitude	Level of effect and significance
TX-01	HDDN1	Evening	55	43	-12	Negligible	Not significant
		Night	45		-2	Negligible	Not significant
	HDDN2.1	Evening	55	45	-12	Negligible	Not significant
		Night	45		0	Negligible	Not significant
	HDDN2.2	Evening	55	43	-12	Negligible	Not significant
		Night	45		-2	Negligible	Not significant
TX-06	HDDN6	Evening	55	55	0	Negligible	Not significant
		Night	55		0	Negligible	Not significant
TX-07	HDDN7	Evening	55	48	-7	Negligible	Not significant
		Night	50		-2	Negligible	Not significant

Assessment of daytime operations

5.11.86 The noise predictions undertaken for the daytime period have assumed a conservative approach, worst-case scenario where trenchless drilling operations are being undertaken at the closest NSR. The assessment in Table 31, indicates that noise levels during this period are predicted to be below the threshold limit. In the worst-case, this will lead to **Negligible impact** magnitude on **Medium sensitivity** receptors, equating to a **Not significant** level of effect, which is considered **not significant** in EIA terms.

Assessment of evening and night-time operations

5.11.87 The noise predictions undertaken for the evening and night-time periods, have assumed a conservative approach; worst-case scenario where trenchless drilling operations are being undertaken at the closest NSR. The assessment in Table 31 above, indicates that noise levels during these periods are predicted to be below the threshold limit. In the worst-case, this will lead to Negligible impact magnitude on **Medium sensitivity** receptors, equating to a **Not significant** level of effect, which is considered **not significant** in EIA terms

5.11.88 In the worst-case, this will lead to **Negligible** impact magnitude on **Medium** sensitivity receptors, equating to a **not significant** level of effect, which is considered **not significant** in EIA terms.

Impact 4: Vibration at trenchless crossings along the Onshore ECR

5.11.89 Potential vibration impacts due to trenchless drilling operations along the ECR has been considered as part of this assessment. The potential vibration impact of this working method has been assessed upon the closest VSRs to each construction activity.

5.11.90 For this assessment, the location of the VSRs is the same as the noise receptors identified within Table 30, where the closest receptor identified is located 15 m from the entry pit of the trenchless crossing compound.

HDD specific predictions

5.11.91 As noted above in the assessment of vibration at Landfall, due to the limitations of applying the cautions found within BS 5228-2 directly to HDD, an alternative prediction methodology has been adopted. Research published by Ciaran C. Reilly (Civil Engineering Research in Ireland, 2020; conference paper: Vibrations due to horizontal directional drilling in Lucan Formation rock and Dublin Boulder Clay) examined predicted and measured vibration levels from HDD operations undertaken to install a pair of cable ducts beneath a light rail line and a busy dual carriageway in Dublin.

5.11.92 Reilly's study predicted PPV levels using the following equation:

$$v_{res} = 35\,r^{-1}$$

V_{res} = resultant PPV, in millimetres per second (mm/s)

r = distance measured along the ground surface, in metres

5.11.93 Using this equation, Reilly predicted that the PPV at a distance of 9 m will be 3.9 mm/s. However, the paper notes that continuous vibration monitoring undertaken during HDD operations found that measured PPV levels were typically below 1 mm/s, indicating that **predicted values significantly overestimated actual vibration levels**. This suggests that the Reilly method provides a conservative estimate of HDD-related vibration impacts.

5.11.94 With regard to the alternative trenchless technique DPM, this involves a comparable bore size and tunnelling methodology to HDD, therefore the resulting vibration levels are expected to be similar.

5.11.95 Applying Reilly's equation to a receptor distance of 15 m gives a predicted PPV level of 2.3 mm/s. Although this prediction is higher than the levels measured by Reilly at 9 m, therefore the inherent conservatism in the method—combined with the documented rapid decay of vibration levels with distance—strongly suggests that actual PPV levels at 15 m **will be below 1 mm/s.**

5.11.96 Given that the closest VSR is located over 15 m from the trenchless drilling compound, and based on both BS 5228-2 and Reilly's research, it is reasonable to conclude that PPV levels at all VSRs will be less than 1 mm/s (**Low** impact), and likely below 0.3 mm/s **(Negligible** impact). This conclusion is supported by the fact that PPV levels rapidly decay with distance, and the conservative nature of Reilly's predictions.

5.11.97 BS5228-2 states that vibration levels between 0.3 and 1.0 mm/s may be perceptible, but *'can be tolerated if prior warning and explanation has been given to residents'.*

5.11.98 Vibration levels decay very rapidly with distance from a source (BS 5228-2). A representative example of trenchless technology given within BS 5228-2 is for boring through silts overlying sandstone with a PPV of 8 mm/s at 4.5 m from the source, decreasing to a PPV of 2.7 mm/s at 7 m from the source, and 1.8 mm/s at 12 m from the source.

5.11.99 As detailed within Impact 2, research published by Ciaran C. Reilly (Civil Engineering Research in Ireland 2020, conference paper: 'Vibrations due to horizontal directional drilling (HDD) in Lucan Formation rock and Dublin Boulder Clay') reported predicted and measured vibration levels, while using HDD to install a pair of cable ducts beneath a light rail line and a busy dual carriageway in the suburb of Drimnagh, Dublin, Ireland. The paper states that a PPV of 3.9 mm/s, was predicted at a distance of 9 m from the surface.

5.11.100 However, during the HDD works continuous vibration monitoring was undertaken, and measured levels were HDD drilling, were typically less than 1 mm/s, at a distance of 10 m. It was found that the measured vibrations in terms of PPV were negligible and much less than predicted values

5.11.101 Given that the closest VSR is located over 15 m from the vibration source, and based on both BS 5228-2 data and Reilly's research, it is reasonable to conclude that PPV levels at all VSR's will be less than 1 mm/s. This conclusion is supported by the fact that PPV levels rapidly decay with distance, and no additional significant sources of vibration are present.

5.11.102 BS5228-2 states that vibration levels between 0.3 and 1.0 mm/s may be perceptible, but '*can be tolerated if prior warning and explanation has been given to residents'.*

5.11.103 The WEDG highlights the importance of transparent and proactive communication with affected communities. Advance notification of construction activities, such as trenchless drilling, will include details on the timing, duration, and nature of the works, as well as the expected noise levels. Ensuring residents are informed can significantly reduce the likelihood of complaints and foster trust between the project team and the community.

5.11.104 With regards to trenchless crossings which require night-time operations (TX-01, TX-06, TX-07), BS 5228-2 highlights that sensitivity to vibration at different times of the day is far more complex than sensitivity to noise. The human body's sensitivity to vibration varies according to the direction and frequency of the vibration. For temporary construction activities, there are instances where vibration magnitudes, above levels generally associated with a low probability of adverse comment, may still be tolerated. Adverse community reactions are sometimes driven by concerns over building damage, even when the vibration is merely just perceptible. It is therefore important to reassure the community that vibration levels must generally be of significant magnitude to cause even cosmetic damage to buildings.

5.11.105 In the worst-case, this will lead to **Low adverse impact** magnitude on **Medium sensitivity** receptors, equating to a **Slight negative** level of effect, which is considered **not significant** in EIA terms.

Impact 5: Noise from construction at the OSS

5.11.106 A programme of the OSS construction works is described in the Project Description Chapter. A summary of the construction works associated with the OSS is given below.

Onshore substation location

5.11.107 The proposed development will include the construction of a new onshore substation (OSS) in the townland of Jamestown, Ballyogan. The new OSS will be located 500 m west of the existing Carrickmines 220 kV substation, the grid connection point (GCP). A grid connection route will connect the OSS to the Carrickmines GCP.

5.11.108 The existing OSS site is located within the extent of the Ballyogan Landfill and Recycling Park which operates under an EPA Waste Licence. A brownfield site characterised by dry meadows and grassy verges. An operational landfill gas compound and methane stripping plant are located to the west of the site, commercially operated by a licence holder on behalf of DLRCC. The OSS will be in an area formerly used as a leachate lagoon however the area has been remediated to grassland.

5.11.109 The Ballyogan Landfill is currently in the aftercare and management phase having ceased acceptance of waste on 29th March 2005. DLRCC are currently transitioning the area formerly used for landfill waste into a public amenity park which will be named Jamestown Park.

5.11.110 The main access to the OSS will be via Ballyogan Road (L6034), using the existing entrance through the DLR Operations Centre and landfill gas compound. To facilitate the proposed OSS and associated construction works the access track will be upgraded and extended to access the two gate entrances proposed along the western boundary of the OSS.

OSS key design parameters

5.11.111 The OSS will comprise a fully enclosed compound with a finished footprint of 1.7 ha and a 4 m high perimeter wall. The compound will consist of three purpose-built buildings, which comprise of a building housing the main 220 kV Gas Insulated Switchgear (GIS), and two Statcom (Static Synchronous Compensator) buildings. In addition to the indoor equipment the OSS will consist of several items of outdoor air-insulated plant within fenced compounds.

5.11.112 To facilitate the construction of the OSS, site preparation works will be undertaken including the provision of a temporary construction compound onsite. The construction works will involve necessary earth works and the installation of site drainage with an attenuation tank.

5.11.113 The OSS proposals include the provision of landscaping, internal hardstanding, access roads, with six car parking spaces, lighting, lightning monopole masts (18 m high), two entrance gates and a perimeter wall (4 m high), and other associated ancillary works.

5.11.114 The layout of the proposed OSS is shown in Figure 69 in the Project Description Chapter. The likely sequence of activities at the OSS are:

- **Site Preparation and Enabling Works**:
  - Removal of vegetation and topsoil.
  - Earthworks and site levelling.
  - Construction of the TCC platform with stone aggregate and asphalt surfacing.
  - Installation of temporary fencing and gates.
  - Installation of temporary drainage measures.
  - Establishment of car parking areas and traffic management controls.
- **Civil Works:**
  - Earthworks to create a level platform.
  - Construction of retaining walls.
  - Installation of cable ducts using open cut trenching.
  - Installation of an earth grid with excavation and conductor placement.
  - Excavation and pouring of concrete for foundations.
  - Erection of structural steel for buildings using mobile cranes.
  - Installation of metal cladding and insulation on buildings.
  - Construction of concrete bunds for oil-filled plant.

- **Electrical Works and Commissioning:**
  - Pulling cables through installed ducts.
  - Internal fit-out of buildings with power, lighting, HVAC, and other services.
  - Installation and testing of HV equipment.
  - Testing and validation of equipment before energization.

5.11.115 With reference to the above, the predicted construction noise levels for the OSS during construction phase works have assumed the following:

- All the plant associated with site preparation (noisiest activity, see Table 25Table 25) has been modelled as an 'area source' within the OSS, meaning the noise is distributed evenly;
- Average source height of 2 m, receptor height of 1.5 m; and
- Ground effect: 0.5.

Receptors

5.11.116 The NSRs considered are shown in Table 33. The Table also shows the grid co-ordinates, the representative baseline monitoring location, the closest working area and distance from the receptor to the closest working area.

Table 33 OSS construction noise: Noise Sensitive Receptors

NSR	Location	Co-ordinates (x, y)	Representative monitoring location
CMOSS1	Ballyogan Rd	120981, 381250	CM1
CMOSS2	Cruagh Rise	119684, 380974	CM2
CMOSS3	Ballyogan Rd	120568, 381354	CM3
CMOSS4	Avalon, Glenamuck Road	120915, 380420	CM4

5.11.117 The locations of the NSRs described above are shown on Figure 10

Figure 10 OSS construction noise – receptor location plan

Predicted noise levels and assessment

5.11.118 The predicted noise levels from the conservative approach; worst-case daytime and weekend construction operations at OSS (site preparation works), are shown in Table 34. The Table also compares the predicted noise levels to the calculated threshold limits and with reference to the assessment criteria in Section 5.5 of this chapter.

5.11.119 It must be noted that an evening or night-time assessment has not been undertaken, as OSS construction works are anticipated to occur during standard working hours, which are 7am - 7pm Monday to Friday and 8am - 2pm on Saturdays.

Table 34 OSS construction - Noise assessment

NSR	Construction activity	Period	Predicted noise level	Threshold limit	Difference	Impact magnitude	Effect significance
CMOSS1	Site preparation works	Daytime	55	65	-10	Negligible	Not significant
CMOSS2			46	65	-19	Negligible	Not significant
CMOSS3			57	65	-8	Negligible	Not significant
CMOSS4			48	65	-17	Negligible	Not significant

5.11.120 In the worst-case, this will lead to **Negligible** impact magnitude on **Medium** sensitivity receptors, equating to a **not significant** level of effect, which is considered **not significant** in EIA terms

Impact 6: Construction noise and vibration O&M Base

5.11.121 The proposed O&M Base will be located on and adjacent to, St. Michael's Pier in Dún Laoghaire Harbour. This part of Dublin Array involves the re-development of existing harbour infrastructure to facilitate the construction of the O&M Base.

5.11.122 . Works include the demolition of the existing single-storey maintenance building on St. Michael's Pier and the proposed construction of a new O&M building.

5.11.123 Demolition works include the removal of the existing Roll-on/Roll-off (RoRo) ramp and will involve the removal of the existing reinforced concrete towers, approach ramp, retaining walls and the reduction of ramp levels to match existing levels in the site. However, these works will be carried out using low-intensity controlled methods, such as saw-cutting concrete into sections, munchers, and excavators. Similarly, the demolition of the single-storey harbour maintenance building at St. Michael's Pier will also be conducted using low-intensity controlled methods.

5.11.124 Following demolition, the construction of the proposed O&M Base will commence with the erection of the building superstructure. The structural frame may be prefabricated off-site where possible, to expedite construction and reduce on-site waste. The construction will follow a bottom-up sequence, with the floor slabs and vertical elements being constructed sequentially.

Receptors

5.11.125 The NSRs considered are shown in Table 35. The Table also shows the grid co-ordinates, the representative baseline monitoring location, the closest working area and distance from the receptor to the closest working area.

Table 35 OSS Construction noise: Noise sensitive receptors

NSR	Description	Co-ordinates (x, y)	Representative monitoring Location	Distance to closest working area (m)
DLN1	Pavilion Apartments, Marine Road	124675, 385394	DL1	320
DLN2	Harbour View, Crofton Road	124483, 385547	DL2	290

5.11.126 The locations of the NSRs detailed above are shown on Figure 11.

Figure 11 O&M Base construction noise: Receptor location plan

5.11.127 The closest receptor DLN2, is located greater than 290 m from the proposed O&M Base, with substantial intervening land comprising transportation, commercial and mixed- use activities. The monitoring results indicate that baseline ambient noise levels at the receptors are moderate, with the baseline ambient levels ($L_{Aeq,T}$) being 54 dB at DL1, and 60 dB at DL2.

5.11.128 Given the large stand-off distance, the moderate existing noise levels, and the urban environment's characteristics, any additional noise or vibration generated by construction activities is expected to be minimal and within acceptable limits.

5.11.129 Additionally, construction-related activities, such as piling or excavation, which could potentially generate higher levels of noise and vibration, are expected to be short-term and localised. The significant distance to the nearest receptors, combined with the existing intervening land use and the moderate ambient noise levels, further reduces the likelihood of significant noise or vibration impacts. Control measures detailed in the CEMP will further mitigate these impacts.

5.11.130 In the worst-case, this will lead to **Negligible** impact magnitude on **Medium** sensitivity receptors, equating to a **not significant** level of effect, which is considered **not significant** in EIA terms.

5.12 Environmental assessment: Operational phase

5.12.1 An assessment has been made in accordance with the guidance contained in BS 4142 to determine whether noise emissions associated with the operation of the proposed **OSS** is likely to give rise to adverse impacts at the NSRs.

5.12.2 As outlined in the Scoped Out Section 5.8, the likelihood of operational sound at the O&M Base exceeding background sound levels at nearby receptors is low; due to the substantial 290 metre separation distance, along with the presence of intervening transportation, commercial, and mixed-use activities contributing to the background noise, and the low-noise nature of the proposed operations that align with the existing commercial harbour environment. As such, the specific sound level is not expected to change the noise environment at the nearest receptors, and a detailed BS 4142 assessment has not been deemed necessary.

5.12.3 Additionally, all infrastructure at the Landfall Site and along the Onshore ECR will be situated underground, with no noise-generating plant or activities expected during the operational phase. The absence of above-ground facilities or activities traditionally associated with noise generation eliminates the need to assess operational noise impacts. Consequently, the operational phase at the Landfall Site and the Onshore ECR has been scoped out of this noise assessment chapter.

Impact 7: Operational noise from the OSS at residential receptors

5.12.4 The proposed OSS will be located at the Ballyogan Landfill Facility and Recycling Park. The landfilling services have ceased and the former landfill has been capped. The Ballyogan Recycling Centre is operational along with the DLR Operations Centre and DLR Maintenance Depot. The layout of the proposed OSS is shown in Figure 69 in the Project Description Chapter.

5.12.5 An assessment has been made in accordance with the guidance contained in BS 4142 to determine whether noise emissions associated with the operation of the proposed OSS is likely to give rise to adverse impacts at the closest residential receptors.

5.12.6 The study area extends to the nearest residential receptors to the north, south, east and west of the proposed OSS; at their furthest extents, these are located approximately 780 m from the proposed site.

Receptors

5.12.7 The NSRs considered for the operational assessment, are identical to those identified within as part of the construction assessment, as shown above on Figure 10, and repeated below in Table 36.

Table 36 OSS operational phase: Noise sensitive receptors

NSR	Location	Co-ordinates (x, y)	Representative monitoring location
CMOSS1	Ballyogan Rd	120981, 381250	CM1
CMOSS2	Cruagh Rise	119684, 380974	CM2
CMOSS3	Ballyogan Rd	120568, 381354	CM3
CMOSS4	Avalon, Glenamuck Road	120915, 380420	CM4

Noise model

5.12.8 Noise modelling has been undertaken on the basis of the design and layout of the proposed OSS, along with the quantity and size of plant that is likely to be required.

5.12.9 The operational noise levels of the plant associated with the substation have been provided by the Applicant and are shown in Table 37 below.

Table 37 OSS operational phase – Noise data

Item of plant	Sound power level, dB (SWL)	Quantity	Height (m)
Shunt reactors	95	6	9
Transformers	70	2	2.5
Statcom - Reactors	90	6	2.5
Harmonic filters	90	6	6

5.12.10 The proposed plant at the OSS has been modelled as a 5-sided box; with the sides modelled as vertical area sources, and the top as an area source[2]. Each item of plant in the model, has been modelled with the following measurements (Length x Width x Height):

- Shunt reactors: 2 m x 2 m x 9 m high;
- Transformers: 7 m x 3 m x 2.5 m high;
- Statcom – Reactors: 3 m x 3 m x 2.5 m high; and
- Harmonic filters: 2 m x 2 m x 6 m high;

5.12.11 With reference to the above, the predicted operational noise levels for the OSS includes the following within the noise model:

- Two Statcom buildings with a ridge height of 7.2 m, and a GIS Building with a ridge height of 15 m. Both buildings are non-noise generating in the model;
- In order to achieve the required finished floor level across the OSS (maximum +89 m OD Malin), the proposals include the constructing a retaining wall at the eastern part of the site, with the land raised and levelled;
- A 4 m high wall around the full boundary, with a 4 m high timber gate at the access point;
- An 8 m high fire wall around the transformers;

2 All plant at the OSS has been modelled as a 5-sided box; with the sides modelled as vertical area sources, and the top as an area source. To represent the sound emissions accurately, each side of the box has been assigned an appropriate sound power level, distributed evenly across the surface area to simulate omnidirectional noise propagation.

- All sources operating 100%, during the daytime and nighttime;
- Ground effect = 0.0 hard ground within the OSS footprint;
- Ground effect = 0.8 hard/mixed ground between the OSS footprint and each receptor;
- a daytime receiver height of 1.5 m, and a night-time receiver height 4 m, approximate height of a ground floor and first floor window respectively at all the NSRs considered;
- A reflection factor of 2; and
- Modelling using methodology found in: ISO 9613-2:2024 Acoustics — Attenuation of sound during propagation outdoors.

5.12.12 The following features of the OSS design, provide additional benefits in relation to noise attenuation, and have therefore been included within the noise model:

- A 4 m high wall will be constructed around the full boundary of the OSS, with 4 m high timber gates at the access points. Although primarily included for other purposes, this continuous barrier offers effective noise reduction by blocking direct line-of-sight propagation to nearby receptors.
- Additionally, an 8 m high fire wall will be installed around the transformers. While its primary function is fire protection, this structure provides significant noise attenuation for these specific noise sources, further minimising potential impacts on sensitive receptors.

5.12.13 These design elements, though not specifically implemented for noise control, contribute to the overall mitigation of noise impacts, enhancing the acoustic environment around the OSS. Based on the above, the worst-case noise levels from construction operations associated with the OSS have been predicted at the nearest NSRs.

BS 4142 assessment

5.12.14 The predicted specific sound level from the operational phase of the OSS at the NSRs described previously in Table 33, is shown in Table 38. The noise model outputs are also shown in Annex C.

Table 38 OSS operational phase – Predicted specific sound level at residential receptors, $L_{Aeq,T}$ dB

NSR	Period	Predicted specific sound level
CMOSS1	Daytime	29
	Night	30
CMOSS2	Daytime	19
	Night	19
CMOSS3	Daytime	30
	Night	31
CMOSS4	Daytime	22
	Night	23

5.12.15 In conjunction with BS 4142, the acoustic character of the sound being generated by the source needs to be considered at the nearest NSRs, which requires corrections for tonal, impulsive or intermittent sounds to be added to the specific levels where required.

5.12.16 In the absence of octave band or third octave band operational data for the OSS, it is considered that a +3 dB character correction will need to be added to the specific sound levels to account for the potential tonal aspects of the sound being generated by the OSS. However, it is considered that no further character corrections will apply as the sound being generated by the OSS is neither intermittent nor impulsive in nature.

5.12.17 A +3 dB character correction has been added to the predicted specific sound levels shown in Table 39, to calculate the rating level ($L_{Ar,T}$) at each NSR.

5.12.18 The rating levels have then been compared to the representative daytime and night-time representative background sound levels as shown in Table 18, and assessed in accordance with BS 4142. The results of this assessment are detailed in Table 39.

Table 39 OSS operational phase – BS 4142 assessment at residential receptors, dB

NSR	Period	Representative background level, $L_{A90,T}$	Predicted specific level, $L_{Aeq,T}$	Rating level, $L_{Ar,T}$	Difference	Impact magnitude	Level of effect and significance
CMOSS1	Daytime	36	29	32	-4	Negligible	Not Significant
	Night	28	30	33	+5	**Low**	**Moderate**
CMOSS2	Daytime	33	19	22	-11	Negligible	Not Significant
	Night	30	19	22	-8	Negligible	Not Significant
CMOSS3	Daytime	41	30	33	-8	Negligible	Not Significant
	Night	34	31	34	0	Negligible	Not Significant
CMOSS4	Daytime	36	22	25	-11	Negligible	Not Significant
	Night	28	23	26	-2	Negligible	Not Significant

5.12.19 It can be seen from Table 39 that during the daytime, the predicted rating levels at all NSRs are below the representative background sound levels, resulting in a negligible impact magnitude and effects that are not significant.

5.12.20 During the night-time, CMOSS1 is the only receptor with a low impact magnitude, where the rating level exceeds the background level by 5 dB, which results in a **Moderate** level of effect.

5.12.21 At all other NSRs, the assessment shows a negligible impact during the night-time, and the effects are not significant. Overall, the potential noise impact from the OSS is largely considered **Negligible** and **not significant**, except for a moderate effect at CMOSS1 during the night-time.

BS 4142 context

5.12.22 In accordance with BS 4142, consideration of the context at CMOSS1 is crucial in assessing the overall significance of the predicted noise impact.

5.12.23 BS 4142 states that when both the background sound level and rating level are low, the absolute level of sound may be more relevant than the difference between the rating and background levels, particularly during the night. In contrast, where residual sound levels are high, they may independently result in adverse impacts, with the exceedance margin providing an indication of the specific source's contribution to these impacts.

5.12.24 While the rating level exceeds the background sound level by 3 dB during the night-time, it is important to note that both the background and rating levels are considered to be relatively low, at 28 dB L_{A90} and 31 dB $L_{Ar,T}$ respectively. These values indicate a quiet environment, and the difference alone may not fully represent the potential impact.

5.12.25 Additionally, at CMOSS1 the residual sound level during the night-time was 36 dB $L_{Aeq,T}$ (value taken from Table 3 of the Noise and Vibration Baseline Report). When operational, the total absolute level (i.e. the residual plus the rating level) will be 37 dB $L_{Aeq,T}$ at CMOSS1. This results in a 1 dB increase, representing a negligible change to the ambient noise level.

5.12.26 In accordance with BS 4142, where the initial estimate of the impact needs to be modified due to the context, all pertinent factors must be considered. In this case, the low absolute sound levels, the negligible 1 dB increase in total ambient noise, and the steady nature of the substation noise are critical factors. While the substation noise may include tonal characteristics that could increase its perceptibility, the absence of impulsive or intermittent features, combined with the low overall ambient noise environment, suggests that the potential for significant disturbance is minimal. Considering these contextual factors, the overall impact at CMOSS1 is assessed as **Negligible** in terms of adverse effects.

Summary

5.12.27 When defining the significance of effect, moderate levels of effect have the potential, subject to professional judgement, to be considered as significant or not significant in EIA terms, depending on the sensitivity and magnitude of change factors evaluated.

5.12.28 After evaluating the receptor and the magnitude of change, it is considered that the change in noise levels at CMOSS1 is **Negligible**. While a moderate effect is noted due to the exceedance of background levels at night, the context of the assessment and the characteristics of the sound suggest that this impact is unlikely to result in significant adverse effects.

5.12.29 After considering the medium sensitivity of the receptor, the nature of the sound, and the level of exceedance, it is concluded that the Moderate impact at CMOSS1 is **not significant** in EIA terms.

5.12.30 Therefore, in the worst-case this will lead to **Negligible** impact magnitude on **Medium** sensitivity receptors, equating to a **not significant** level of effect, which is considered **not significant** in EIA terms.

Impact 8: Operational noise from the OSS at commercial receptors

5.12.31 At the OSS location there are commercial receptors which are located closer than residential areas. The assessment of the noise impact on nearby commercial receptors in relation to the likely levels of operational noise produced by the OSS has been undertaken with reference to the IEMA guidelines.

5.12.32 For the purpose of this assessment, the commercial receptors at the DLR Operations Centre, located 90 m North of the OSS, have been considered.

5.12.33 The method of the assessment involves logarithmically adding the predicted specific noise levels from the OSS, to the baseline ambient noise level ($L_{Aeq,T}$), and then assessing any changes in noise levels in conjunction with the guidelines. While it is considered unlikely that the commercial receptors will be occupied during the night-time, a night-time assessment has been undertaken to represent a worst-case assessment.

5.12.34 The predicted specific levels do not include any penalties for the character of the sound generated, as these are associated with the guidance contained in BS 4142 and does not apply to the assessment.

5.12.35 The assessment is shown in Table 40, and the predicted specific noise levels have been determined using the same method described in Impact 7 above.

Table 40 OSS operational phase: IEMA assessment for commercial receptors, L_{Aeq} dB

NSR	Period	Existing ambient level	Predicted specific sound level	Total ambient level	Change	Impact magnitude	Level of effect and significance
DLR Operations Centre	Daytime	48	34	48	0	Negligible	Not Significant
	Night-time	45		45	0	Negligible	Not Significant

5.12.36 The assessment shows that the total ambient noise levels will remain unchanged, during both daytime and night-time periods. Given the low predicted noise levels and lack of any significant increase to the ambient noise environment, no mitigation measures are deemed necessary for the commercial receptors.

5.12.37 In the worst-case, this will lead to **Negligible** impact magnitude on **Medium** sensitivity receptors, equating to a **not significant** level of effect, which is considered **not significant** in EIA terms.

5.13 Environmental assessment: Decommissioning phase

Onshore Electrical System

5.13.1 The construction, operation and maintenance works associated with the OES will be managed by the Applicant until the end of the proving period and handover of ownership to EirGrid. As the enduring asset owner, EirGrid will become responsible for decommissioning of the transferring assets at the end of their deemed lifetime.

5.13.2 Accordingly, this planning application does not seek permission for decommissioning of the OES. However, for the purpose of enabling a comprehensive environmental impact assessment, we have set out below our recommended approach to decommissioning, should EirGrid choose to decommission any aspect of the OES. This approach is informed by the Applicant's experience of decommissioning onshore substations and onshore export cables on other projects and knowledge of how EirGrid typically do this.

In addition, we have set out below the factors which should inform any decision by EirGrid to decommissioning:

- The baseline environment at the time decommissioning works are carried out;
- Technological developments relating to decommissioning of onshore transmission infrastructure;
- Changes in what is accepted as best practice relating to decommissioning of onshore transmission infrastructure;
- Submissions or recommendations made by interested parties, organisations and other bodies concerned with decommissioning of onshore transmission infrastructure; and
- Any new relevant regulatory requirements.

5.13.3 Further, any decommissioning works must:

- Comply with any decommissioning specific conditions in the Development Consent;
- Ensure that the environmental impacts are consistent or less in scale and magnitude to those predicted in the EIAR, Natura Impact Statement and Water Framework Directive Assessment associated with the Development Consent or any amendment of the Development Consent or any subsequent consent EirGrid might be granted in respect of decommissioning; and
- Comply with the relevant health and safety regulations.

5.13.4 A decommissioning plan, along with an environmental management plan, should be prepared before any decommissioning works begin. If necessary, an application for consent should be made by EirGrid, and submitted to the relevant competent authority, in respect of any decommissioning works which require consent. We would expect any such application to involve further environmental assessment and public participation, and for any decision made by the competent authority to be judicially reviewable.

O&M Base

5.13.5 A Decommissioning and Restoration Plan has been included in Volume 7 Appendix 7.2 of the Environmental Impact Assessment Report. As outlined in the Decommissioning and Restoration Plan, the O&M building will be either re-purposed for an alternative use or demolished following the decommissioning of the offshore infrastructure.

5.13.6 Following the decommissioning of the offshore infrastructure the fencing and pontoon will be removed and the hardstanding area will be taken over by DLRCC for general harbour operations.

5.13.7 Decommissioning activities for the OES and the O&M Base are not anticipated to exceed the construction phase design parameters which have been assessed in Section 5.10. Accordingly, it is anticipated that there would be the same level of impact and resulting level of effect and significance (or less) in comparison to the assessment of construction effects set out in Section 5.10 of this chapter.

Summary

5.13.8 Decommissioning activities are not anticipated to exceed the construction phase worst case criteria which have been assessed in Section 5.11.

5.13.9 With some infrastructure remaining in situ and only certain components removed, noise and vibration impacts will be **lower** during the decommissioning phase, than those assessed during construction. The decommissioning of the Operations and Maintenance base will involve either repurposing or demolition, with noise and vibration impacts managed in line with best practices. The overall effect is considered **not significant** in EIA terms.

5.14 Environmental assessment: Cumulative effects

Methodology

5.14.1 This section outlines the cumulative impact assessment for onshore noise and vibration and takes into account the impacts of Dublin Array alongside other projects or plans.

5.14.2 The cumulative impacts assessment for noise has been undertaken in accordance with the methodology provided in Volume 2, Chapter 4: Cumulative Effects Assessment Methodology, based on the driver, pressure, state, impact and response (DPSIR) model.

5.14.3 An initial screening exercise has been undertaken on a long list, to identify any projects which are relevant to the assessment of onshore noise and vibration impacts. Projects have then been considered and scoped in or out on the basis of effect–receptor pathway, data confidence and the temporal and spatial scales involved.

Projects scoped out

5.14.4 Projects have been scoped out on the basis of the distance of the source-receiver-pathway, and on the nature of the noise produced. Noise, whether it is generated during construction or operation of a development, will diminish with distance.

5.14.5 Projects were scoped out where the noise impacts from other construction activities were determined to be too distant, or of insufficient magnitude to combine with those of the OES.

5.14.6 The cumulative impacts assessment for operational noise, focuses on proposed developments which would introduce new NSRs, or new sources of commercial noise. This approach ensures that the assessment considers only those projects likely to introduce new or additional noise impacts. In all cases the projects on the cumulative long-list were located near to sections of the OES or O&M Base where the effects will at most Slight Adverse and not significant.

Projects for cumulative assessment

5.14.7 Based on the screening exercise and assessment methodology, no cumulative projects or plans have been identified that will result in overlapping noise or vibration impacts with the Dublin Array. Therefore, no cumulative effects are predicted for either the construction or operational phases of the project.

5.15 Interactions of the environmental factors

5.15.1 A matrix illustrating the likely interactions of the foregoing arising from the proposed development on noise and vibration receptors is provided in Volume 8, Chapter 1: Interactions of the Environmental Factors.

5.15.2 Interactions of the foregoing are considered to be the effects and associated effects of different aspects of the proposal on the same receptor. These are considered to be:

- Project lifetime effects: Assessment of the scope for effects that occur throughout more than one phase of the project (construction, operation and decommissioning) to interact and potentially create a more significant effect on a receptor than if just assessed in isolation in these three project phases.
- Receptor-led effects: Assessment of the scope for all effects to interact, spatially and temporally, to create inter-related effects on a receptor. For example, all effects on noise and vibration receptors may interact to produce a different, or greater effect on this receptor than when the effects are considered in isolation. Receptor-led effects might be short-term, temporary or transient effects, or incorporate longer term effects.

5.15.3 No project lifetime effects will occur at a receptor, as noise will dissipate once a phase of the project, e.g. construction, passes.

5.15.4 Receptor led effects concern the accumulation of impacts on a single receptor between noise and vibration generated during the construction and operation of the onshore infrastructure and other environmental disciplines. It is considered likely that during the construction and operational phases, human receptors impacted by onshore noise and vibration are also likely to be affected by other environmental impacts such as changes in traffic, air quality, and landscape and visual amenity. All of these human receptors are assessed together in Volume 5, Chapter 9: Human Health (hereafter referred to as the Human Health Chapter). As reported in the Human Health Chapter, it is not anticipated that these inter-relationships will lead to any significant effects greater than the assessments presented for each discipline.

5.15.5 Increased traffic movements during construction, operation, and decommissioning phases have the potential to increase existing ambient noise levels. A detailed assessment of noise from construction traffic associated with all onshore works has been scoped out due to the relatively low projected HGV volumes across all onshore infrastructure. Overall, it is not anticipated that the inter-related effect of traffic on noise receptors will lead to a combined effect of greater significance than the effect on the receptor in the absence of the interaction.

5.15.6 Noise from construction works will likely result in some avoidance behaviour by fauna. This is addressed in Volume 5, Chapter 2: Biodiversity. There may be disturbance and avoidance behaviour during the construction/demolition works, however this will be temporary and short-term and not likely to be significant. Overall, the inter-related effects will not be of greater than the effect on the receptor in the absence of the interaction.

5.15.7 An assessment of potential effects on human health of Dublin Array on vulnerable and sensitive populations, including noise emissions, is presented in the Human Health Chapter, informed by the results of this chapter. It concludes that construction and operational noise due to the onshore infrastructure will not lead to significant effects on the general population and vulnerable and sensitive groups.

5.16 Transboundary statement

5.16.1 There are no national transboundary implications with regards to local noise and vibration as the onshore infrastructure will not be sited in proximity to any international boundaries.

5.17 Summary of effects

5.17.1 This assessment has considered the potential noise and vibration effects arising from activities associated with the construction, operation and decommissioning of onshore infrastructure elements of the Dublin Array project. Conservative approach has been applied with the use of worst-case parameters have been adopted to provide a robust assessment.

5.17.2 Alternative configurations of noise control measures that will provide equivalent noise reductions may deployed when there is greater certainty on the proposed construction operations with the advancement in detailed planning and design. This will be agreed in consultation with the planning authority.

Table 41 Summary of noise and vibration effects

Description of effect	Onshore infrastructure/ activities	Effect	Proposed additional mitigation measures	Residual effect
Construction phase				
Impact 1: Noise from construction works (including drilling) at Landfall Site	Noise effects arising from construction works during the daytime construction activity includes site preparation works and piling operations (adopting a conservative approach using worst case assumptions)	Moderate adverse (not significant)	No further mitigation beyond project design measures included in Section 5.10 which include the implementation of 3.5 m high acoustic fencing (i.e. close boarded fence/plywood hoarding) around the Landfall Site TCC.	A Moderate adverse effect that is **not significant** effect should site preparation works and piling operations occur concurrently
	Noise effects arising from trenchless drilling works evening and night-time, for the offshore export cable ducts at the Landfall Site	Not significant	No further mitigation beyond project design measures included in Section 5.10 which include the implementation of a 5.2 m high noise barrier around drilling rigs, and a 3 m around pumping and mixing plant.	**Not significant**
Impact 2: Vibration from construction works (including drilling) at Landfall Site	Vibration effects arising from trenchless drilling operations at Landfall	**Slight adverse** (not significant)	Not applicable – no additional mitigation identified.	No significant adverse residual effects relating to vibration
	Vibration effects arising from piling operations	**Slight adverse** (not significant)	Not applicable – no additional mitigation identified.	
Impact 3: Noise from construction of the Onshore ECR	Noise effects arising from open cut trenching (sections not requiring drilling)	**Slight adverse** (not significant)	Not applicable – no additional mitigation identified.	No significant adverse residual effects relating to noise
	Noise effects arising from trenchless drilling operations (all TX crossing locations)	Not significant	No further mitigation beyond project design measures included in Section 5.10 which include the implementation of acoustic	**Not significant**

Description of effect	Onshore infrastructure/ activities	Effect	Proposed additional mitigation measures	Residual effect
			fencing at all trenchless crossings as presented in Section 5.10. Location of plant away from the NSR as far as reasonably practicable. Alternatively, selecting plant and/or working methods with lower noise levels.	
	Noise effects arising from evening and nighttime trenchless drilling operations (TX01, TX-06 & TX-07 only)	Not significant	No further mitigation beyond project design measures included in Section 5.10 which include the implementation of: TX-01 - A 5.2 m high noise barrier Acoustic fencing as per details in Section 5.10 at other nighttime drilling locations.	No significant adverse residual effects relating to noise
Impact 4: Vibration from trenchless drilling operations along the onshore ECR	Vibration effects arising from trenchless drilling operations (all crossings)	**Slight adverse**	Not applicable – no additional mitigation identified	No significant adverse residual effects relating to vibration
Impact 5: Noise from construction at the Onshore Substation	Noise effects arising from all construction activities at the OSS	Not significant	Not applicable – no additional mitigation identified	**Not significant**
Impact 6: Construction noise and vibration at the O&M Base	Noise and vibration effects arising from all construction activities at the O&M Base.	Not significant	Not applicable – no additional mitigation identified	**Not significant**
Operational phase				
Impact 7: Operational noise from the OSS at residential receptors	Noise effects from operations at the OSS upon residential receptors	Not significant	Not Applicable – no additional mitigation identified	Not significant

Description of effect	Onshore infrastructure/ activities	Effect	Proposed additional mitigation measures	Residual effect
Impact 8: Operational noise from the OSS at commercial receptors	Noise effects from operations at the OSS at commercial receptors at the OSS.	Not significant	Not applicable – no additional mitigation identified	Not significant
Decommissioning phase				
Noise and vibration during decommissioning phase		Not significant	Not applicable – no additional mitigation identified	No noise and vibration significant adverse residual effects
Cumulative effects				
None				
Transboundary				
None				

5.18 References

BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'. Available at: https://knowledge.bsigroup.com/products/methods-for-rating-and-assessing-industrial-and-commercial-sound?version=standard [Accessed: January 2025].

British Standards Institution (February 2014), 'Code of practice for noise and vibration control on construction and open sites – Noise' https://knowledge.bsigroup.com/products/code-of-practice-for-noise-and-vibration-control-on-construction-and-open-sites-noise?version=standard&tab=overview [Accessed: December 2023].

Civil Engineering Research in Ireland 2020: Conference Proceedings, 'Vibrations due to horizontal directional drilling in Lucan Formation rock and Dublin Boulder Clay'. Available at: https://www.researchgate.net/publication/343944216_Vibrations_due_to_horizontal_directional_drilling_in_Lucan_Formation_rock_and_Dublin_Boulder_Clay [Accessed: December 2023].

Danish Ministry of Environment (February 2019), 'Executive Order on Noise from Wind Turbines'. Available at: https://www.retsinformation.dk/eli/lta/2019/135 [Accessed: December 2023].

Department of Housing, Local Government and Heritage (2018), 'Project Ireland 2040 National Planning Framework'. Available at: https://www.gov.ie/en/publication/774346-project-ireland-2040-national-planning-framework/ [Accessed: December 2023].

Department of Housing, Local Government and Heritage (December 2019), 'Draft Revised Wind Energy Development Guidelines'. Available at: https://www.gov.ie/pdf/?file=https://assets.gov.ie/46097/6e68ea81b8084ac5b7f9343d04f0b0ef.pdf#page=null [Accessed: December 2023].

Department of Communications, Climate Action & Environment (April 2017), 'Guidance on EIS and NIS Preparation for Offshore Renewable Energy Projects'. Available at: https://www.gov.ie/pdf/?file=https://assets.gov.ie/76533/6a82b451-e09f-483b-849e-07d4c7baa728.pdf#page=null [Accessed: December 2023].

Department of the Environment, Heritage and Local Government (2006), 'Wind Energy Development Guidelines'. Available at: gov.ie - Wind Energy Development Guidelines (2006) [Accessed: December 2023].

Dublin Array (2020), 'Dublin Array Offshore Wind Farm. Environmental Impact Assessment Scoping Report', September 2020, Revision 1, prepared by SLR/GoBe/RWE. Available at: https://dublinarray.com/wp-content/uploads/2020/10/Dublin-Array-EIAR-Scoping-Report-Part-1-of-2.pdf [Accessed: January 2025].

Dublin City Council et. al. (December 2018), 'Dublin Agglomeration Environmental Noise Action Plan December 2018 – July 2023'. Available at: https://www.sdcc.ie/en/services/business/permits-and-licensing/noise/dublin-agglomeration-noise-action-plan-summary.pdf [Accessed: December 2023].

Dún Laoghaire-Rathdown County Council (April 2022), 'County Development Plan 2022-2028'. Available at: https://www.dlrcoco.ie/sites/default/files/atoms/files/written_statement.pdf [Accessed: December 2023].

Environmental Protection Agency (May 2022), 'Guidelines on the information to be contained in Environmental Impact Assessment Reports'. Available at: https://www.epa.ie/publications/monitoring--assessment/assessment/EIAR_Guidelines_2022_Web.pdf [Accessed: December 2023]

European Communities (Environmental Noise) Regulations, 2018 (S.I. No. 549 of 2018). Available at: S.I. No. 549/2018 - European Communities (Environmental Noise) Regulations 2018 [Accessed: January 2025].

European Communities (Environmental Noise) (Amendment) Regulations, 2021 (S.I. No. 663 of 2021). Available at: https://www.irishstatutebook.ie/eli/2021/si/663/made/en/print [Accessed: January 2025].

Institute of Environmental Management and Assessment (November 2014) 'Guidelines for Environmental Noise Impact Assessment': Available at: CD13.05 Guidelines for Environmental Noise Impact Assessment IEMA_0.pdf [Accessed: January 2025].

ISO 9613-2:2024 Acoustics — Attenuation of sound during propagation outdoors. Available at: https://www.iso.org/standard/74047.html [Accessed: January 2025].

Statutory Instruments (June 2011), 'European Communities (Marine Strategy Framework) Regulations'. Available at: https://www.irishstatutebook.ie/eli/2011/si/249/made/en/pdf [Accessed: December 2023].

Statutory Instruments (December 2018), 'European Communities (Environmental Noise) Regulations'. Available at: https://www.irishstatutebook.ie/eli/2018/si/549/made/en/print [Accessed: December 2023].

Statutory Instruments (December 2021), 'European Communities (Environmental Noise). (Amendment) Regulations'. Available at: https://www.irishstatutebook.ie/eli/2021/si/663/made/en/print [Accessed: December 2023].

UK Department for Trade and Industry (September 1996), 'The Assessment and Rating of Noise from Wind Farms'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/49869/ETSU_Full_copy__Searchable_.pdf [Accessed: December 2023].

UK Institute of Acoustics (May 2013), 'A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise'. Available at: https://www.ioa.org.uk/sites/default/files/IOA%20Good%20Practice%20Guide%20on%20Wind%20Turbine%20Noise%20-%20May%202013.pdf [Accessed: December 2023].

Wicklow County Council (September 2022), 'Wicklow County Development Plan 2022-2028'. Available at: https://www.wicklow.ie/Portals/0/adam/Documents/NZy04adS4UupjOnDVMmH9g/Link/Volume%201%20-%20FULL%20Written%20Statement%20CDP%202022-2028%20as%20altered.pdf [Accessed: December 2023].

Wind Energy Ireland (March 2012), 'Best Practice Guidelines for the Irish Wind Energy Industry'. Available at: https://windenergyireland.com/images/files/9660bdfb5a4f1d276f41ae9ab54e991bb600b7.pdf [Accessed: December 2023].

Annex A Regulatory background

The following sections address the statutory planning policy requirements and regulatory control of noise and vibration generated by development activities.

Legislation

In addition to the law and policy backdrop detailed in the Consents, Policy, Legislation and Guidance Chapter, there are two legislative instruments which address the effects of environmental noise with regard to noise nuisance. The Environmental Protection Agency Act 1992 as amended (EPAA) and the Environmental Noise Regulations 2006 as amended (ENR).

The Environmental Protection Agency Act of 1992 (EPAA), mandates Local Authorities to investigate noise originating from industrial, trade, or business premises, as well as from vehicles, machinery, or equipment in public spaces. The focus is to assess whether such noise is detrimental to health or qualifies as a statutory nuisance. Upon the Local Authority's determination that noise poses health risks or constitutes a statutory nuisance, the EPA empowers the Local Authority to issue an abatement notice. This notice obligates the party responsible for the noise to take measures preventing its occurrence.

Section 107 of the EPAA relates to the power of a local authority to require measures to be taken to prevent or limit noise other than relating to a licensable activity under Part IV of the EPAA. The local authority may service a notice which will indicate requirements for the prevention or limitation of the noise within a specified person. A person on whom a notice is served shall within the period specified in the notice, comply with the requirements of the notice. If compliance with the notice is not forthcoming, the local authority may take such steps as it considers reasonable and necessary to secure compliance with the notice and may recover any costs and expenses thereby incurred from the person on whom the notice was served.

In addition to section 107, section 108 of the EPAA is entitled 'noise as nuisance'. Where any noise which is so loud, so continuous, so repeated, of such duration or pitch or occurring at such times as to give reasonable cause for annoyance to a person in any premises in the neighbourhood or to a person lawfully using any public place, a local authority, or any such person may bring proceedings before the District Court. The Court may order the person or body making, causing or responsible for the noise to take the necessary measures to reduce the noise to a specified level or to take specified measures for the prevention or limitation of the noise.

The assessment work completed in this chapter will inform the Minister of State and the relevant Local Planning Authorities as to benchmark baseline sound levels and construction sound levels.

The Environmental Noise Regulations 2006 (ENR) were amended by the Environmental Noise (Amendment) Regulations 2021 to give further effect to the implementation of Directive 2002/49/EC establishing a common framework to avoid, prevent or reduce, on a prioritised basis, the harmful effects of exposure to environmental noise. They amend the methods for assessment of harmful effects of noise from road, rail and aircraft and also update agglomeration definitions in light of expansions in the urban landscape over the last 15 years. The "agglomeration of Dublin" continues to specifically include the county of Dún Laoghaire-Rathdown.

Policy

Details of policies which are relevant to this assessment are provided in Table 1 in this Chapter, together with an indication of where each requirement is addressed.

The National Planning Framework (NPF) 2040 (published in February 2018) is a national planning framework for Ireland. The framework provides the policies for all regional and local plans. In the framework, the extractive industries are recognised as important for the supply of aggregates and construction materials to a variety of sectors.

Furthermore, the Draft First Revision of the National Planning Framework (published in November 2024), builds upon the original NPF 2040 and outlines revised policies to support Ireland's sustainable development, regional growth, and climate transition. While the draft does not introduce significant changes directly related to noise management, it reinforces the importance of integrating environmental considerations into planning and development at all levels. The draft framework remains subject to consultation and further refinement before its final adoption.

Standards and guidance

Reference is also made to the following Standards and Guidance documents:

- British Standard BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise (BS 5228-1);
- British Standard BS 5228:2009 + A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration (BS5228-2);
- British Standard BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound (BS 4142);
- EPA 2022 Guidelines on the information to be contained in Environmental Impact Assessment Reports; and
- IEMA Guidelines for Environmental Noise Impact Assessment.

British Standard BS 5228-1:2009+A1:2014 Code of Practice for noise and vibration control on construction and open sites – Part 1: Noise

The impact of construction noise arising from the onshore works, upon residential receptors is determined with reference to BS 5228-1.

The guidance sets out methodology for predicting noise levels arising from a wide variety of construction and related activities and contains tables of sound power levels generated by a wide variety of mobile and fixed plant equipment.

Compliance with BS 5228-1 is expected as a minimum standard when assessing the impact of construction noise upon the existing noise environment at nearby sensitive receptors.

Noise levels generated by construction operations and experienced at local receptors will depend upon a number of variables, the most significant of which are likely to be:

- The amount of noise generated by plant and equipment being used at the development site, generally expressed as a sound power level;
- The periods of operation of the plant at the development site, known as the ‘on-time’;
- The distance between the noise source and the receptor, known as the ‘stand-off’;
- The attenuation due to ground absorption or barrier screening effects; and
- Reflections of noise due to the presence of hard vertical faces such as walls.

BS 5228-1 gives several examples of acceptable noise limits for construction or demolition noise. For this assessment, as baseline noise data is available, the ABC method has been used to determine the threshold value at the receptor locations. Appendix 6.5.5-1 Noise and Vibration Technical Baseline Report.

Under the ABC method, a threshold noise level is determined by measuring the existing ambient noise level at each location. This measured noise level, representing the average sound energy over a period of time (referred to as $L_{Aeq,T}$), is rounded to the nearest whole 5 dB(A). The value is then used to determine the threshold noise level for each receptor, based on Table E.1 of BS 5228-1.

In simpler terms, $L_{Aeq,T}$ is a way to measure the ‘average’ noise level over a given time period, factoring in all the variations in sound during the time period. For construction noise assessments, this threshold represents the maximum noise level, averaged over the relevant time period, that will not be exceeded at a receptor location due to site activities.

If the threshold value is exceeded, then the effect of construction noise upon nearby receptors may be significant. BS 5228-1 states that the significance of the effect will depend upon ‘other project-specific factors, such as the number of receptors affected and the duration and character of the impact.’ Professional judgement will be used to determine whether an effect is considered to be significant, and commentary explaining the reasons for this judgement will be provided. In accordance with this method, the threshold noise levels for a potentially significant effect are detailed in Table A1 below.

Table A1 Construction noise: BS5228 ABC method threshold values

Assessment category and threshold value period (LAeq)	Threshold value, in decibels (dB)		
	Category A [A)]	Category B [B)]	Category C [C)]
Night-time (23.00-07.00)	45	50	55
Evenings and weekends D)	55	60	65
Daytime (07.00-19.00) and Saturdays (07.00-13.00)	65	70	75
NOTE 1: A significant effect has been deemed to occur if the total LAeq noise level, including construction, exceeds the threshold level for the Category appropriate to the ambient noise level. NOTE 2: If the ambient noise level exceeds the threshold values given in the Table (i.e. the ambient noise level is higher than the above values), then a significant effect is deemed to occur if the total LAeq noise level for the period increases by more than 3 dB due to construction activity. NOTE 3: Applied to residential receptors only.			
[A)] Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values. [B)] Category B: threshold values to use when the ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values. [C)] Category C: threshold values to use when the ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values. [D)] 19.01-23.00 weekdays, 13.01-23.00 Saturdays and 07.01-23.00 Sundays.			

Note that the targets in Table A-1 are considered to be noise level limits externally at the closest noise sensitive window. They are not considered as internal noise targets.

British Standard BS5228:2009 + A1:2014 Code of Practice for noise and vibration control on construction and open sites – Part 2: Vibration

The impact of construction vibration arising from the onshore works, upon sensitive receptors is determined with reference to 5228-2:2009+A1:2014.

BS5228:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration gives recommendations for basic methods of vibration control relating to construction and open sites where work activities/operations generate significant vibration levels.

The majority of people are known to be very sensitive to vibration, the threshold of perception being typically in the PPV range of between 0.14 mms-1 and 0.30 mms-1. Vibration levels above these values can cause disturbance. BS5228-2:2009+A1:2014 provides guidance on the effects of vibration shown in Table A2 below.

Table A2 Risk of complaints from vibration levels

Vibration level, mms^{-1}	Effect
0.14	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.30	Vibration might be just perceptible in residential environments.
1.00	It is likely that vibration of this level in residential environments will cause complaint but can be tolerated if prior warning and explanation has been given to residents.
10.00	Vibration is likely to be intolerable for any more than a very brief exposure to this level.

With reference to the table above, BS5228-2:2009+A1:2014 states when construction activities are of a temporary nature, situations will exist, both during the day and night, where vibration magnitudes above those generally corresponding to a low probability of adverse comment level can be tolerated. However, adverse community reaction is sometimes based upon concern over building damage, even when the vibration is just perceptible. It is therefore important to assure the community that vibration levels generally have to be of significant magnitude for even cosmetic damage to occur.

High vibration levels generally arise from 'heavy' construction works such as piling, deep excavation, dynamic ground compaction or drilling.

Annex E of BS 5228-2 contains empirical formulae derived by Hiller and Crabb (2000) from field measurements relating to resultant PPV, with a number of other parameters for vibratory compaction, dynamic compaction, percussive and vibratory piling, the vibration of stone columns and tunnel boring operations. These prediction equations are based on the energy approach. Use of these empirical formulae enables resultant PPV to be predicted and for some activities (vibratory compaction, vibratory piling and vibrated stone columns) they can provide an indicator of the probability of these levels of PPV being exceeded.

The empirical equations for predicting construction-related vibration provide estimates in terms of PPV. Therefore, the consequences of predicted levels in terms of human perception and disturbance can be established through direct comparison with the BS 5228-2guidance vibration levels shown in the table above.

British Standard BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound

BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound (BS 4142) is intended to be used to assess the potential adverse impact of sound, of an industrial and/or commercial nature, at nearby sensitive receptor locations within the context of the existing sound environment.

Where the specific sound contains tonality, impulsivity and/or other sound characteristics, corrections will be applied depending on the perceptibility. For tonality, a correction of either 0, 2, 4 or 6 dB will be added; for impulsivity, a correction of either 0, 3, 6 or 9 dB will be added and if the sound contains specific sound features which are neither tonal nor impulsive a penalty of 3 dB will be added.

In addition, if the sound contains identifiable operational and non-operational periods that are readily distinguishable against the existing sound environment, a further correction of 3 dB may be applied.

The assessment of impacts contained in BS 4142 is undertaken by comparing the sound rating level, i.e. the specific sound level of the source plus any character corrections, to the measured representative background sound level immediately outside the sensitive receptor location. Consideration is then given to the context of the existing sound environment at the sensitive receptor location to assess the potential impact.

Once an initial estimate of the impact is determined, by subtracting the measured background sound level from the rating sound level, BS 4142 states that the following will be considered:

- Typically, the greater the difference, the greater the magnitude of the impact;
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context; and
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. It is an indication that the specific sound source has a low impact when the rating level does not exceed the background sound level, depending on the context.

BS 4142 contains guidance for the consideration of the context of the potential impact, including consideration of the existing residual sound levels, location and/or absolute sound levels.

The impact of operational noise from the substation noise upon residential receptors will be determined with reference to BS 4142.

EPA 2022 Guidelines on the information to be contained in Environmental Impact Assessment Reports (‘2022 Guidelines’)

The 2022 Guidelines apply to the preparation of all EIARs undertaken in the State. The 2022 Guidelines are described by the EPA as an authoritative reference to those preparing EIARs for projects. The 2022 Guidelines are a statutory document.

The primary purpose of the 2022 Guidelines is to set out what information needs to be contained in an EIAR as well as the methods used in preparing the EIAR. The 2022 Guidelines advise on general principles and methods relating to the EIA process.

Of note is section 3 of the 2022 Guidelines is entitled 'Preparing an EIAR' and this section contains key guidance (including infographics) on how to carry out each of the stages of work that are required to prepare an EIAR.

Section 4 addresses the topic of 'Presenting the Information in an EIAR'. This section contains subsections dealing with topics such as content, structure, language, appendices, size, and non-technical summary.

Overall, the 2022 Guidelines play an important role in assisting competent authorities when considering EIARs during the decision-making processes prior to granting/refusing consent.

IEMA Guidelines for Environmental Noise Impact Assessment

The Institute of Environmental Management and Assessment (IEMA) 'Guidelines for Environmental Noise Impact Assessment', Version 1.2, published in November 2014, is a UK guidance document addressing the key principles of noise impact assessment. It is applicable to *'all development proposals where noise effects are likely to occur'* and *'relevant to all types of projects, regardless of size.'*

While the guidelines provide comprehensive support on various aspects of noise impact assessment, this report specifically references their guidance on the definition and evaluation of the significance of changes in noise levels. According to the guidance, the significance of noise effects is typically influenced by the magnitude of change in noise levels relative to baseline conditions, the sensitivity of the receptors, and the context in which the change occurs. This guidance has been applied exclusively to assess the potential noise impacts from the development at commercial receptors.

Annex B Construction plant sound levels

Presented below are the indicative sound power levels for the construction plant required in each construction phase, the indicative number required and the estimated percentage the plant will be operating during the activity.

Table B1 Plant utilised in site preparation, including fencing, haul road construction and topsoil strip, dB L_{WA}

Vehicle/ equipment	Sound power level	Quantity	On-time (%)	Resultant sound power level
D6 Dozer	109	1	100	109
30T excavator	103	2	100	106
20T Dumper	109	3	100	114
Smooth Drum vibro road roller	103	1	100	103
21T excavator	106	1	100	106
5T Forward Tipping Dumper	106	1	100	106
Loading shovel	108	1	100	108
Tractor & fencing kit	108	1	100	108
Tractor & trailer	107	1	70	105
Tractor & Fuel bowser (or self-propelled)	117	1	10	107
Tractor & Water bowser (for dust suppression)	111	1	25	105
Grader	114	1	100	114
Telehandler	107	1	70	105
Mobile self-contained welfare unit	94	1	25	88
Mobile generator	102	2	25	99
Temporary lighting	93	12	25	98
Logarithmic sum				**120**

Table B2 Plant utilised in TJB excavation, dB L_{WA}

Vehicle/equipment	Sound power level	Quantity	On-Time (%)	Resultant sound power level
30T excavator	103	1	100	103
20T Dumper	109	2	100	112
Smooth Drum vibro roller	103	1	10	93
21T excavator	106	1	50	103
5T Forward Tipping Dumper	106	1	50	103
Tractor & Fuel bowser (or self-propelled)	117	1	10	107
Tractor & Water bowser (for dust suppression)	111	1	25	105
Mobile self-contained welfare unit	94	1	25	88
Mobile generator	102	2	25	99
Temporary lighting	93	4	25	93
Pump	106	2	100	109
Logarithmic sum				**116**

Table B3 Plant utilised in TJB wall and base construction, dB L_{WA}

Vehicle/ equipment	Sound power level	Quantity	On-time (%)	Resultant sound power level
Tractor and trailer	107	1	50	104
Tractor and fuel bowser (or self-propelled)	117	1	10	107
Tractor and water bowser (for dust suppression)	111	1	25	105
Mobile concrete pump/concrete mixer truck	108	1	50	105
Telehandler	107	1	50	104

Vehicle/ equipment	Sound power level	Quantity	On-time (%)	Resultant sound power level
Mobile self-contained welfare unit	94	1	25	88
Mobile generator	102	2	50	102
Temporary lighting	93	4	25	93
Pump	106	2	100	109
Logarithmic sum				**114**

Table B4 Plant utilised in connection of cables in transition bays, dB L_{WA}

Vehicle/ equipment	Sound power level	Quantity	On-time (%)	Resultant sound power level
Tractor and trailer	107	1	50	104
Tractor and fuel bowser (or self-propelled)	117	1	10	107
Tractor and water bowser (for dust suppression)	111	1	25	105
Mobile crane	110	1	25	104
Cable laying tracked crane	103	1	25	97
Telehandler	107	1	50	104
Mobile self-contained welfare unit	94	1	20	87
Crawler Crane	103	1	25	97
Mobile generator	102	2	100	105
Temporary lighting	93	4	50	96
Pump	106	2	100	109
Logarithmic sum				**115**

Table B5 Plant utilised in roof and backfill over transition bay, dB L_{WA}

Vehicle/ equipment	Sound power level	Quantity	On-time (%)	Resultant sound power level
D6 Dozer	109	1	100	109
30T excavator	103	1	100	103
20T Dumper	109	2	100	112
21T excavator	106	1	100	106
5T forward tipping dumper	106	1	100	106
Loading shovel	108	1	100	108
Trench roller	101	1	75	100
Tractor and trailer	107	1	25	101
Tractor and fuel bowser (or self-propelled)	117	1	10	107
Tractor and water bowser (for dust suppression)	111	1	25	105
Cement mixer	89	1	25	83
Mobile crane	110	1	25	104
Pre-cast concrete truck	111	1	5	98
Telehandler	107	1	25	101
Mobile self-contained welfare unit	94	1	25	88
Mobile generator	102	2	25	99
Temporary lighting	93	4	25	93
Pump	106	2	100	109
Logarithmic sum				**118**

Table B6 Plant utilised in jointing bay base construction, dB L_{WA}

Vehicle/ equipment	Sound power level	Quantity	On-time (%)	Resultant sound power level
Tractor and trailer	107	1	50	104
Tractor and fuel bowser (or self-propelled)	117	1	10	107
Tractor and water bowser (for dust suppression)	111	1	25	105
Mobile concrete pump/cement mixer truck	108	1	50	105
Telehandler	107	1	50	104
Mobile self-contained welfare unit	94	1	25	88
Mobile generator	102	2	50	102
Temporary lighting	93	4	25	93
Pump	106	2	100	109
Logarithmic sum				**114**

Table B7 Plant utilised in pulling and connection of cables, dB L_{WA}

Vehicle/ equipment	Sound power level	Quantity	On-time (%)	Resultant sound power level
Tractor and fuel bowser (or self-propelled)	117	1	10	107
Tractor and cable drum trailer	108	1	50	105
Cable winch	111	1	50	108
Mobile self-contained welfare unit	94	1	25	88
Mobile generator	102	2	25	99

Vehicle/ equipment	Sound power level	Quantity	On-time (%)	Resultant sound power level
Temporary lighting	93	4	25	93
Pump	106	2	100	109
Logarithmic sum				**114**

Table B8 Plant utilised in backfill over jointing bay, dB L_{WA}

Vehicle/ equipment	Sound power level	Quantity	On-time (%)	Resultant sound power level
D6 dozer	109	2	100	112
30T excavator	103	2	100	106
20T dumper	109	2	100	112
21T excavator	106	1	100	106
5T forward tipping dumper	106	1	100	106
Loading shovel	108	1	100	108
Trench roller	101	1	75	100
Tractor and fuel bowser (or self-propelled)	117	1	10	107
Tractor and water bowser (for dust suppression)	111	1	25	105
Mobile self-contained welfare unit	94	1	25	88
Mobile generator	102	2	25	99
Temporary lighting	93	4	25	93
Pump	106	2	100	109
Logarithmic sum				**118**

Table B9 Plant utilised in TCC operations, dB L_{WA}

Vehicle/ equipment	Sound power level	Quantity	On-time (%)	Resultant sound power level
Generator	102	2	100	105
Wheel wash	108	1	10	98
Telehandler	107	1	75	106
Road sweeper	104	1	10	94
Logarithmic sum				**109**

Table B10 Plant utilised in trenchless drilling compound operations (including drilling), dB L_{WA}

Vehicle/ equipment	Sound power level	Quantity	On-time (%)	Resultant sound power level
HDD rig	95	1	100	95
Drill generator	95	1	100	95
Mixing tank	98	1	100	98
Recycling tank	93	1	100	93
Mud pump	95	2	100	98
Generator	90	1	100	90
Logarithmic sum				**103**

Table B11 Plant utilised in OSS groundworks, dB L_{WA}

Vehicle/ equipment	Sound power level	Quantity	On-time (%)	Resultant sound power level
Excavator (earthworks)	102	6	100	110
Excavator (hydraulic breaker)	113	4	100	119
Dozer	107	4	75	112
Air compressor	100	4	100	106
Dump truck	105	8	70	112
Generator	100	2	100	103
Crusher	116	2	80	118
Logarithmic sum				**123**

Table B12 Plant utilised in OSS building foundation works, dB L_{WA}

Vehicle/ equipment	Sound power level	Quantity	On-time (%)	Resultant sound power level
Large rotary bored piling rig	83	1	100	83
Tracked drilling rig with hydraulic drifter	82	1	100	82
Crane mounted auger	79	1	100	79
Mini piling rig	76	2	100	79
Compressor for mini piling	75	1	100	75
Dump truck	105	4	50	108
Truck mixer with pump	103	2	10	96
Excavator (earthworks)	102	3	80	106
Grinder	108	5	50	112
Compressor	100	2	100	103
Generator	100	2	100	103
Logarithmic sum				**115**

Table B13 Plant utilised in OSS access road and car parking road works, dB L_{WA}

Vehicle/ equipment	Sound power level	Quantity	On-time (%)	Resultant sound power level
Excavator	102	2	100	105
Dump truck	105	4	70	109
Asphalt spreader with support lorry	106	1	100	106
Vibratory roller	106	2	70	107
Grader	112	1	100	112
Logarithmic sum				**116**

Table B14 Plant utilised in OSS building fabrication and HV plant installation, dB L_{WA}

Vehicle/ equipment	Sound power level	Quantity	On-time (%)	Resultant sound power level
Mobile crane	102	1	50	99
Lorry	103	3	25	102
MEWP	78	2	75	80
Dump truck	105	4	10	101
Compressor	100	1	100	100
Forklift truck	105	2	50	105
Grinder	108	5	50	112
Pneumatic chipper/drill	114	3	50	116
Scaffolding	100	1	25	94
Logarithmic sum				**118**

Annex C Noise model plots

Figure C 1 Impact 1: Noise effects arising from evening and night-time trenchless drilling operations at Landfall (TX-00), dB $L_{Aeq,T}$

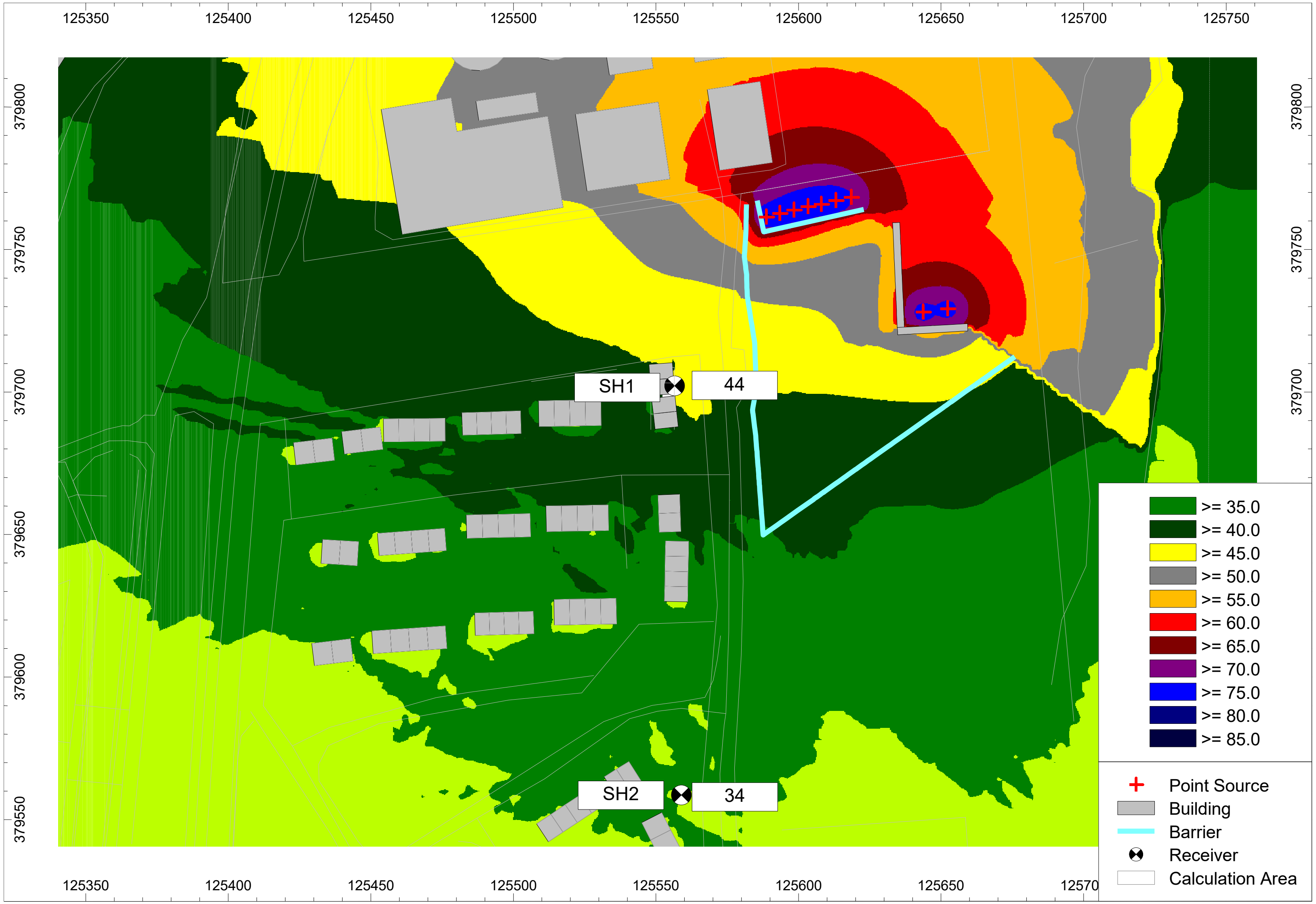


Figure C 2 Impact 3: Noise effects arising from evening and night-time trenchless drilling operations at TX-01, dB $L_{Aeq,T}$

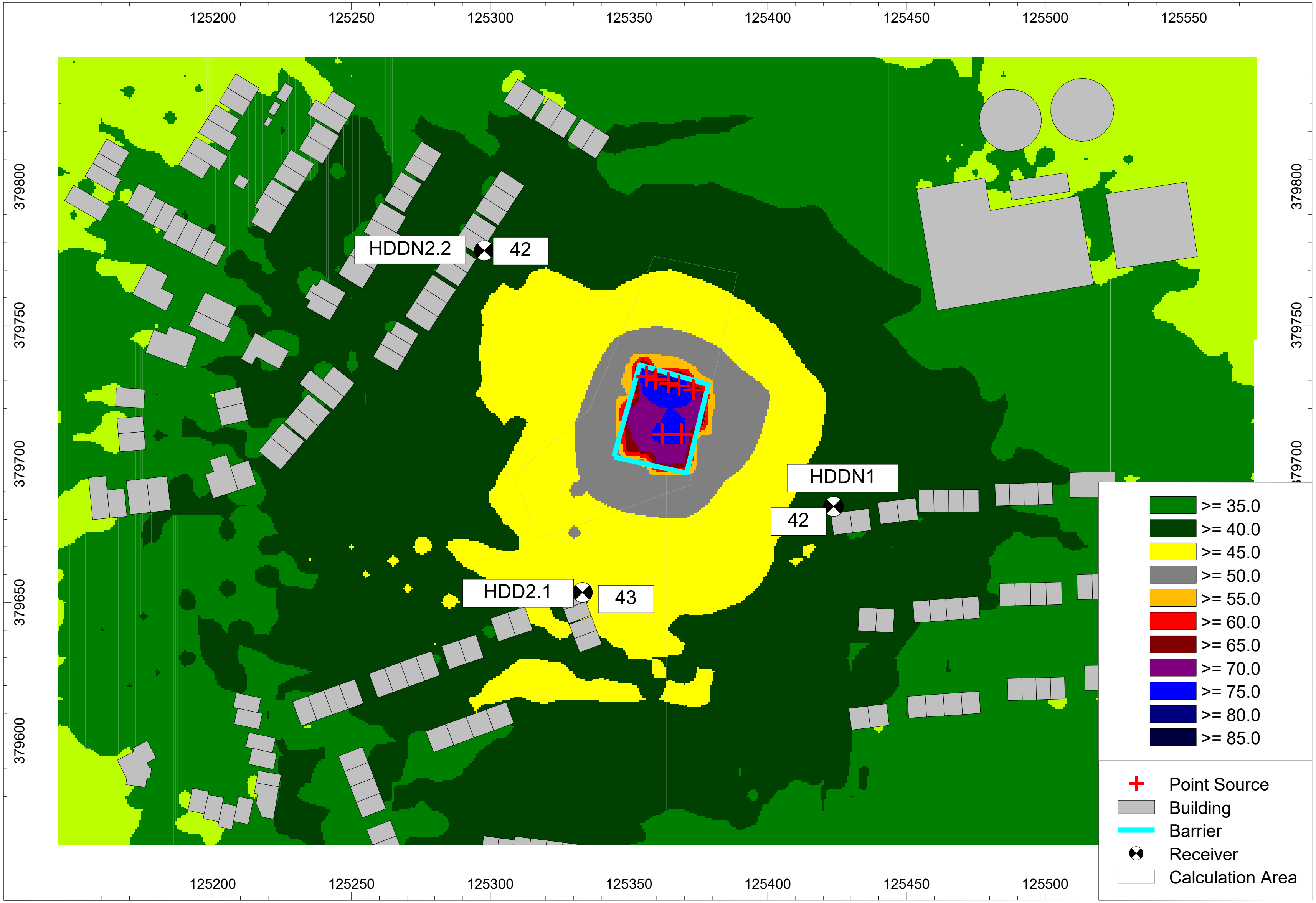


Figure C 3 Impact 3: Noise effects arising from evening and night-time trenchless drilling operations at TX-06, dB $L_{Aeq,T}$

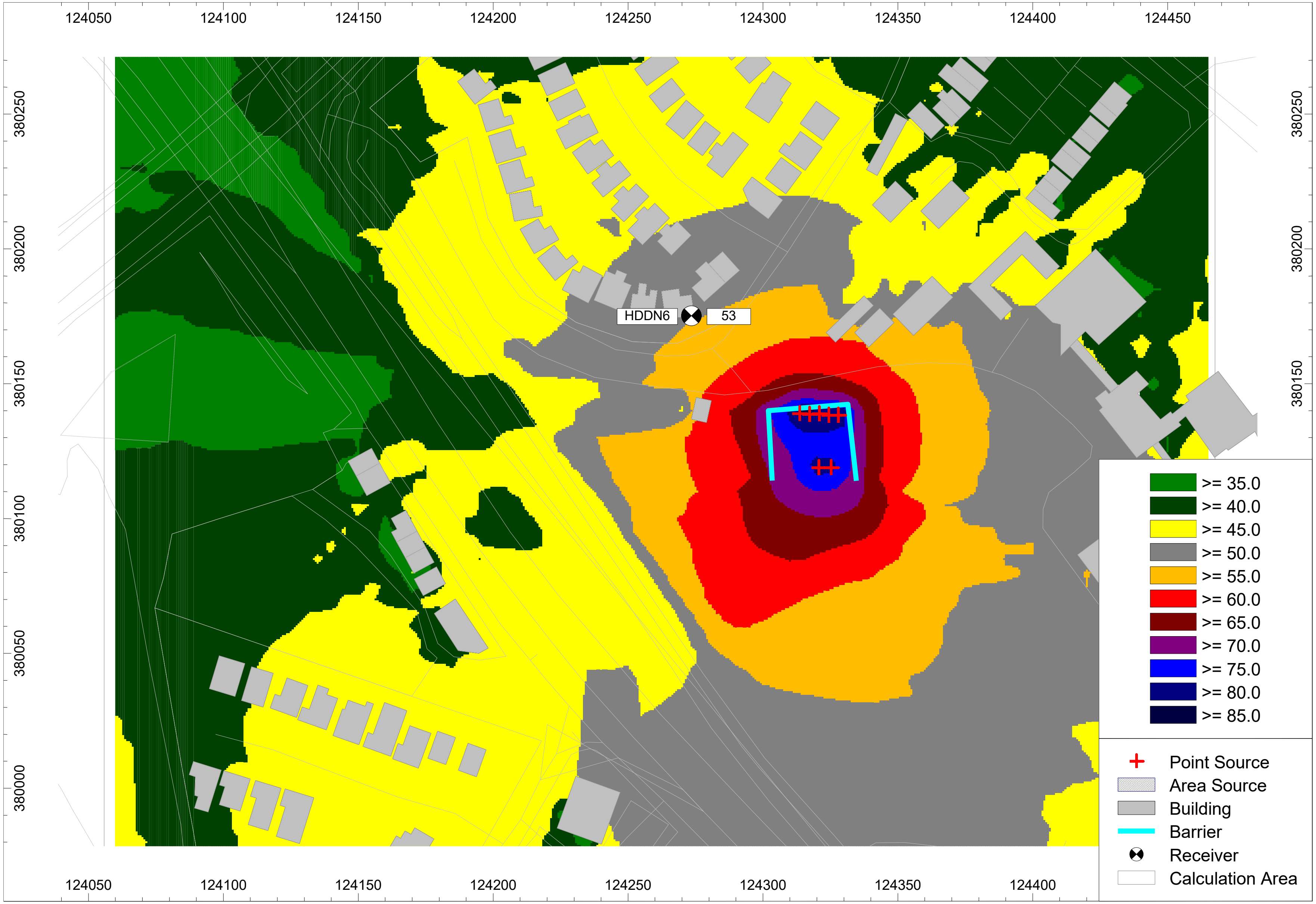


Figure C 4 Impact 3: Noise effects arising from evening and night-time trenchless drilling operations at TX-07, dB $L_{Aeq,T}$

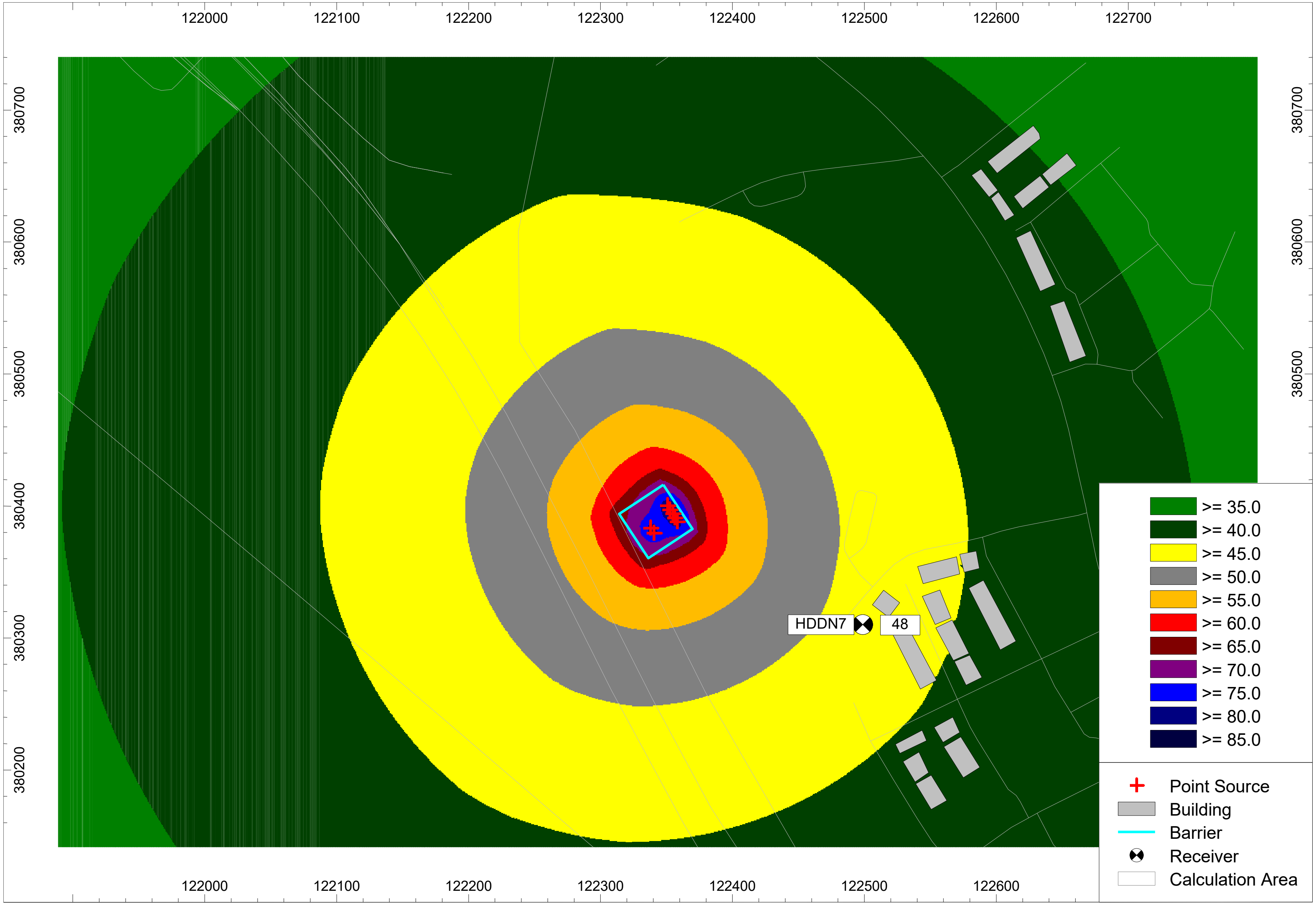
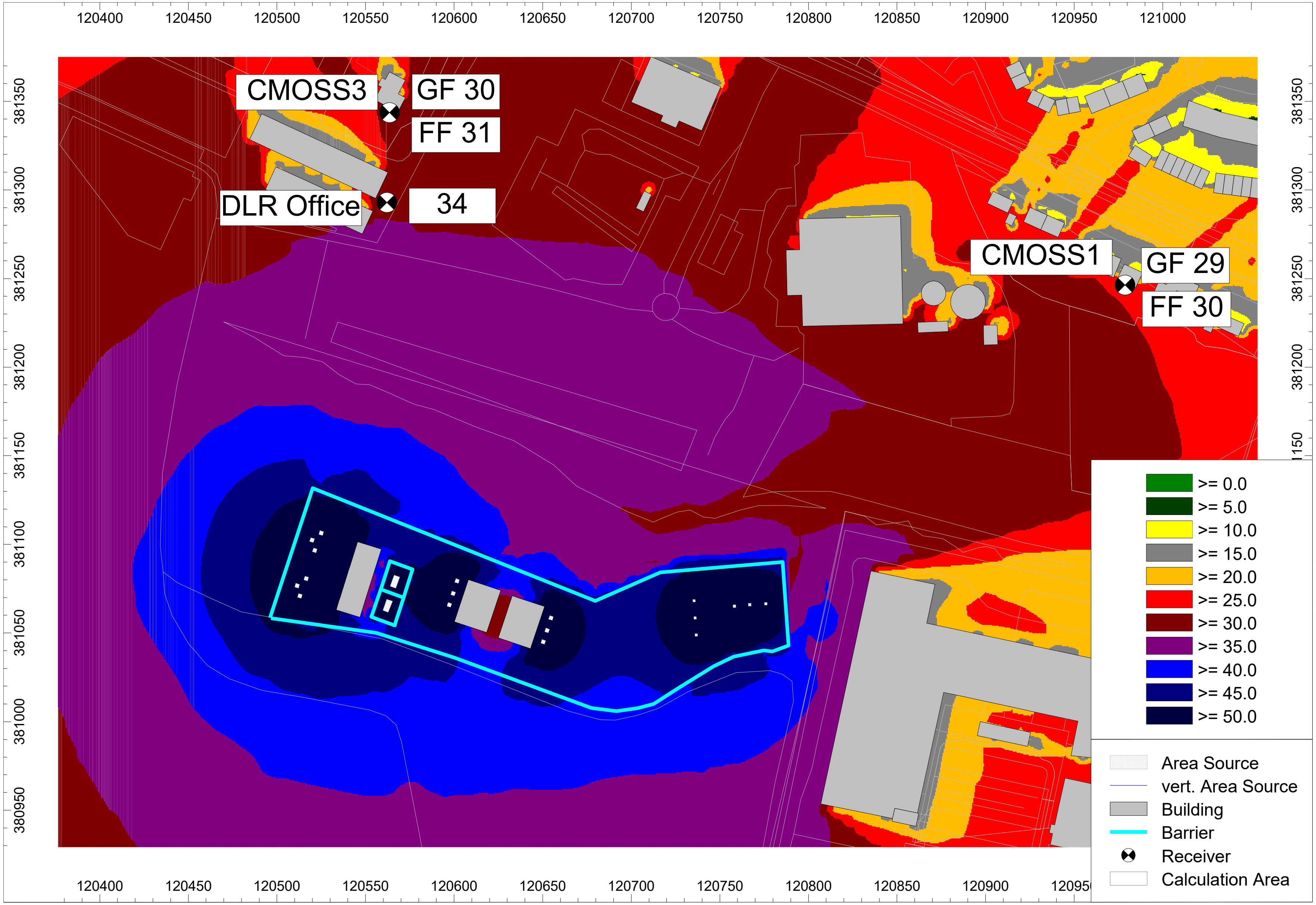


Figure C 5 Impact 7 & 8: Noise effects from operations at the OSS at residential and commercial receptors, dB $L_{Aeq,T}$



Registered office:
Unit 5,
Desart House,
Lower New Street,
Kilkenny
www.RWE.com